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Faculty of Physical Education and Sport

Diploma

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Department of physiotherapy

Case Study Patient with Diagnosis After Fracture of Acetabulum on Left Side

BACHELOR DEGREE PROGRAM IN PHYSIOTHERAPY

Author Saad Al Amri

Supervisor Mgr. Helena Vomackova

Instructor Bc. Tomas Modlinger

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ABSTRACT

Title of the thesis: Case study of patient after fracture of acetabulum in left side
Author: Saad Al Amri
Work placement: Kladno Hospiatal

Summary

In the bachelor thesis, which was written by myself, it is divided in two parts, theoretical part and special part.

The theoretical part describes anatomy of hip joint, it's bones, muscles, ligaments, nerves and blood supply of the hip joint. Information about kinesiological and biomechanical point of view were discussed as well.

In the practical part I analyzed procedures I have done with the patient, all examinations, conclusions, therapies and results.

Last part of the bachelor thesis it contains list of literature used in the bachelor thesis, it contains list of figures and tables used in the thesis, abbreviations and the ethics committee.

Keywords: hip joint, acetabulum, range of motion, fracture, pelvis, exercise

DECLARATION

I declare that the bachelor thesis was written by me independently and by supervising of Mgr. Helena Vomackova. It is an original research, which refers to practice with patient after fracture of acetabulum on left side, under supervising of Bc Tomas, practice took place at Kladno Hospital in Kladno.

I state that all information, examinations, and therapeutic procedures, which are presented in the bachelor thesis, were performed based on my knowledge that I got from professors of Charles University Faculty of Physical Education and Sport. Information used in writing the bachelor thesis were sourced from list of literature, which is placed at the end of the thesis.

Finally I declare that there was no invasive methods used during clinical practice and that patient was fully aware of examinations and therapies at any time.

ACKNOWLEDGMENT

It’s my pleasure to have this space to thank so much all of my professors, who taught me for three years of my studying at Faculty of Physical education and Sport, special thanks to PhDr. Dagmar Pavlu the head department of physiotherapy for her help and understanding during the years of study, special thanks for Mgr. Helena Vomackova who did and helped me a lot during my study, special thanks for my supervisor Bc Tomas Modlinger who lead my clinical practice at Kladno Hospital.

DEDICATION

I would like to dedicate the bachelor thesis to my family for their support all the time of my study abroad. And to my professors who were giving me a lot during the last three years of study to havle the knowledge in physiotherapy

Contents

1.Introduction

Physiotherapy program I had with the patient, took place at Kladno Hospital in Kladno. Physiotherapy program started on Monday 13.7.2015 and ended on Friday 24.7.2015.

The case study of physiotherapy practice that I choose for patient after around four months of fracture of acetabulum on left side and after around four months of external fixation for whole left leg. I choose this patient for my bachelor thesis because it is first time to treat a patient with tis diagnosis as case study.

Goals of therapy were to decrease swelling, increase range of motion, activation and stimulation of left lower extremity weak muscles.

In the bachelor thesis, which is divided in two parts, theoretical part and special part. The theoretical part describes anatomy of hip joint, it's bones, muscles, ligaments, nerves and blood supply of the hip joint. Information about kinesiological and biomechanical point of view were discussed as well. In the practical part, there is examinations and therapies for the patient including anamnesis, prior rehabilitation, present state of the patient, indication of rehabilitation, initial kinesiological examinations, conclusion of examinations, short and long term rehabilitation plan, therapy progress, final kinesiological examinations, evaluation of therapy, conclusion and prognosis

2.General overview of hip joint

The hip joint is a movable joint/ diarthosis found between the femur and the pelvic bones. It is a true ball-and-socket joint which allows for movement in several physical planes while also exhibiting remarkable stability. This is as a result of the presence of powerful and well-balanced muscles surrounding the joint. The hip joint is therefore found at the point of articulation between the hind limbs and the pelvic bones and therefore connects the hind limbs and the axial skeleton (5) It is therefore involved in the transmission of forces from the ground up the trunk of the body and also carries the forces from the other parts of the body such as the trunk, neck, head and the fore limb. It is also responsible in movement and other vigorous activities such as running, jumping and kicking (1).

2.1.Anatomy of the hip joint

The hip joint is a synovial joint/ diarthodial joint found between the femur and the pelvic girdle. It therefore has a joint cavity in the pelvic girdle, an articular cartilage covering the joint surfaces, synovial membrane secreting synovial fluid and, head of femur and a ligamentous capsule surrounding the joint (2). The pelvic girdle has a socket called the acetabulum which cup-shaped while the femur has a prominent head called the head of the femur. The acetabulum is therefore a concave depression component of the hip joint. The head of the femur and the acetabulum of the pelvic girdle articulate forming the ball and socket joint called the hip joint (5). Anatomically, the acetabulum is found just below the middle third of the inguinal ligament and therefore forms the articular surface of the head of femur (11). The acetabulum is covered by a thick cartilage at the upper part while both the middle and lower parts devoid of the cartilage but the middle part of the acetabulum has fibroblastic fat. The acetabulum is a contribution of the three bones of the pelvic girdle namely ilium, ischium and pubis (5). The central inferior acetabulum fossa at the middle of the acetabulum which is filled with fats houses the synovial covered fat pad and provides points for attachment of the ligament trees. The acetabulum labrum is attached to the acetabular rim helps in the enlargement and deepening of the part of the acetabulum that comes into contact with the head of the femur during articulation and thus increasing

the stability of the joint. Due to the articulation and coming into contact with the head of femur, the acetabular labrum is a fibrocartilaginous ring to reduce friction at the point of contact. The transverse aacetabular ligament on the other hand does not have cartilage and forms a foramen for the entry of the nerves and the blood vessels into the joint (11).

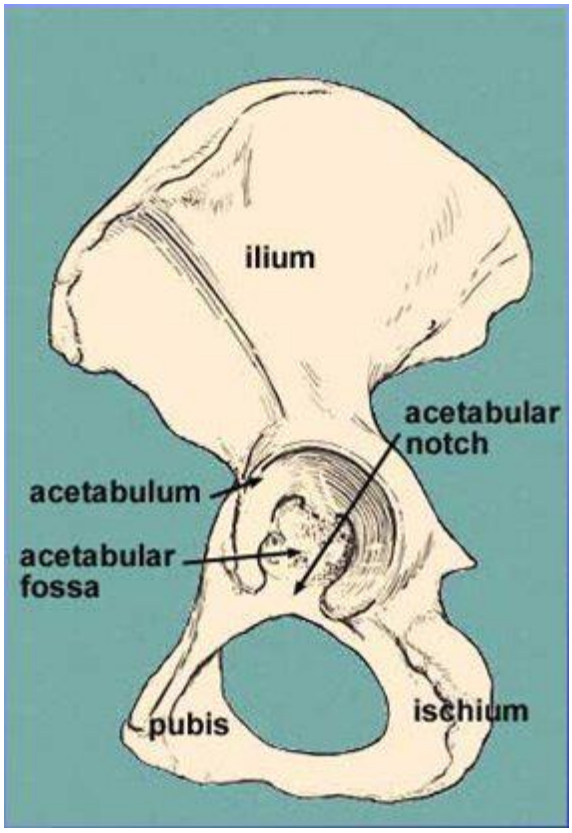

Figure 1-Arcetabular labrum (6)

The arcetabular labrum is involved in the normal development of the joint and distribution of forces in the joint. It is also involved in the exertion of the negative pressure effect by restricting the movement of the synovial fluid to the peripheral parts of the hip. Due to its articulation with the femur, the acetabulum therefore faces obliquely forward, outward and downward (11).

The head of femur is spheroid in shape/ oval in shape to enable it fit into the acetabulum of the pelvic girdle. The head of the femur is covered by hyaline cartilage which covers the femoral head and acts as a shock absorber and reduces friction at the joint (11). The cartilage is thickest at the point where the head of the head of femur come into

contact with the acetabulum and carries more weight of the body parts. It has a rough pit which lacks cartilage whose role is to articulate with the ligament trees (11). The head of the femur is connected to the shaft through the neck femur. The size of the femoral neck varies in length depending with the size of the body. The attachment of the neck to the shaft is at an angle which is around 120-130 degrees in normal adults. This enables the femoral shaft to be laterally displaced from the pelvic bone thus enabling for the free movement at the hip joint. The head of the femur undergo anteversion where the head is slightly to the coronal plane (5).

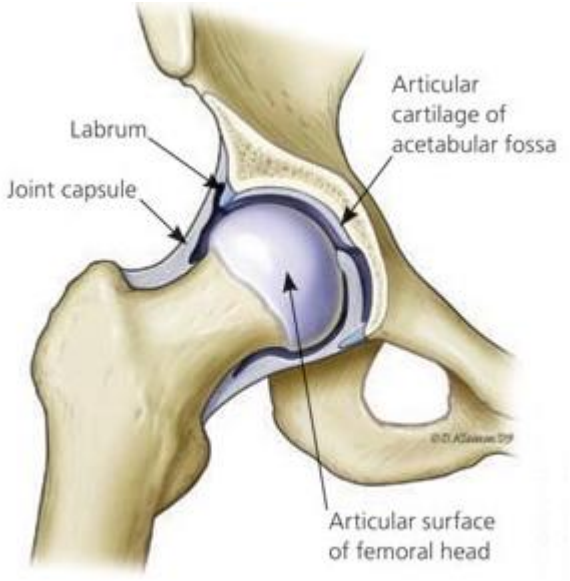

Figure 2- Structure of the hip joint (1)

The pelvic bone and the bones of the lower back are designed to support the body's weight and provide attachment for the attachment of the abdominal and back muscles. The hip bone consists of an innominatte bone of the pelvic girdle and articulate with the sacrum and the coccyx (7). The inomminate bone is composed of three bones namely ilium, ischium and pubis. The three bones of the pelvic girdle are fused together to form immovable joints thus forming the inomminate bone (5). There are two hip bones each consisting of three bones that are joined together at the pubis symphysis by hyaline cartilage. The two bones therefore join each other in a Y-shaped position. The ilium is the largest bone of the pelvic girdle which is divided into the body and ala. The pubis and the

ischium lie below the islium and the three fused together especially in adults. The sacrum of the vertebral column is articulated to the pelvis between the crest of the ilium (10The sacrum is then attached to the coccyx which is the last fused vertebrae of the vertebral column. The pubic bone is the anterior bone of the hip bone which is anterior to both the ilium and ischium of both halves of the pelvic girdle. The pubic bone is covered by fats which are covered by the moms pubis. It is also divided into three parts namely body, superior ramus and inferior ramus.

The pelvic bone is found in the pelvic region and therefore consists of the reproductive organs. It also forms the terminal of the digestive tract. It comprises of various bones such as the femur, ilium, ischium and pubis where the pelvic girdle meet with the femur to form a ball and socket joint (5). The bones of the pelvic girdle join together and all contribute to the formation of the acetabulum which is a capsule where the head of the femur articulate (8). This capsule is strong in order to be able to support the weight of the body (3). The capsule is highly ligamentous to give the hip a great stability. Beside the strength of the capsule, there are weak positions such as between the pubofemoral and iliofemoral ligaments and between the iliofemoral and ischiofemoral ligaments. These weak points form points where dislocation under extreme external trauma (9).

The ischium is the bone found on the lower side of both the ilium and the pubis at the back of the hip bone/ pelvic girdle (15). Ischium forms part of the acetabulum where the superior portion of the ischium forms about a third of the acetabulum. It is also divided into the body, superior ramus and inferior ramus (12).

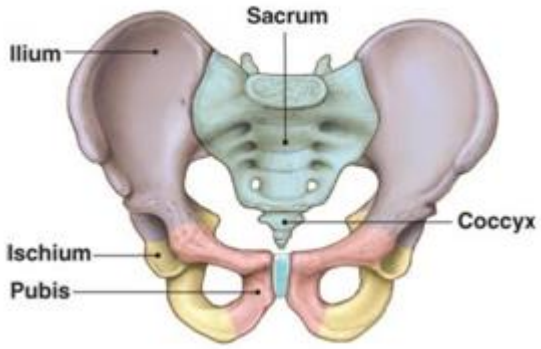

Figure 3- The pelvic girdle (7)

2.2.Kinesiology and biomechanics at the hip region

The movement at the hip joint takes place in the three palnes namely sagittal (flexion-extension), frontal (abduction-adduction) and transverse (internal-external rotation). This therefore results in the rotation at the joint, adduction and extension (12). The flexion and extension of the femur at the sagittal plane as a result of the frontal axis rotation passing through the centre of the femur leads to activities such as cycling and squatting. Frontal plane is responsible for adduction and abduction while transverse plane is responsible for the internal and external rotation at the joint (10).

The ability to achieve smooth gait in the body is determined by the way the concentric and the eccentric muscles are synchronized to attain a balanced gait and strides. In situations where they are not properly synchronized, the individual will not attain the required smooth gait and vice versa (10). This is also associated with how well the synergistic muscles work as well as the coordination of the antagonistic muscles (4). In order to maintain the required position between the head of the femur and the acetabulum, the body has a neuromuscular loop. There is also a proprioceptive feedback which is determined by the position of the body and receptors in the joint and from intrinsic muscular properties (10). These properties include the muscle spindle fiber and sarcomere length and the heel stride determining the magnitude of the forces experienced in the hip during strides.

2.3.Muscles in the hip

Hip joint is a very flexible joint in the body of a human being. Apart from the flexibility of the joint, the joint allows for movement and carrying the weight of the body. Due to this, the joint comprises of many muscles to provide movement, strength and stability at the joint. The muscles are therefore located at various locations in the joint and therefore the muscles can be grouped into about four groups according to their locations (4). The groups of muscles in the hip joint are the posterior group, adductor group, anterior group and the abductor group. These muscles are therefore adapted to perform various functions according to their groups. The anterior muscles are further categorized as iliopsoas group and the quadriceps femoris group which are involved in the contraction

bringing about flexion/ bending of the femur at the hip joint (4). The iliopsoas groups include psoas major and iliacus muscles while the quadriceps femoris group includes rectus femoris, vastus intermedius, vastus lateralis, and vastus medialis. These muscles are therefore involved in various activities such as lifting of the leg, sitting up and ball kicking due to their contractive nature of the muscles (7).

The posterior group of muscles in the hip joint is involved in the extension of the femur. They are therefore involved in the straightening of the femur at the hip joint when they contract. They work antagonistically to the anterior group of muscles where the posterior muscles contract when the anterior muscles relax and relax when the anterior muscles contract. The posterior group of muscles can be further be categorized into gluteus maximus muscle and the hamstring muscles. The hamstring group of muscles includes the biceps, semiteninosus muscles, femoris and semimemranosus muscles which are all involved in the straightening of the femur. Due to the activities undertaken by these muscles, the muscles are therefore strong in order to contract forcefully to bring about the extension of the group (7).

Movement of the femur towards the midline of the body is undertaken by the adductor muscles also called the groin muscles. They are therefore involved in the adduction of the femur (5). These muscles are located at the medial side of the femur. This group of muscles is further classified as the adductor longus, gracilis muscles, adductor magnus, pectineus, and adductor brevis. These muscles are sensitive to the extent of extension and therefore they should not be overstretched. Overstretching of the adductor muscles may cause groin pull at the joint (6).

Abduction of the femur at the joint is caused by the contraction of the abductor muscles. The abductor muscles are located on the lateral side of the femur and therefore are antagonistic to the adductor muscles bringing the femur away from the midline of the body when they contract (7). This is important in activities of the body that require separation of the legs. The abductor muscles are categorized into gluteus medius, piriformis, tensor fasciae latae, superior gemellus, and inferior gemellus, sartorius, and gluteus minimus muscles (8).

2.4.Ligaments around the hip

Ligaments which are connective tissues are used in the reinforcement of the hip joint. The ligaments are involved in the articulation of the various bones joining the various bones at the joint (9). There are four ligaments that are involved in the articulation at the joint. These ligaments are subdivided into extracapsular and intracapsular ligaments (1). The extracapsular ligaments include ischiofemoral, ilipfemoral and pubofemoral which are located at different points at the joint. The ligaments are majorly involved in the provision of strength to the capsule and therefore involved in the regulation of the degree of the movement of the femur at the joint region. Iliofemoral ligament is the strongest ligament at the hip joint whose role is to prevent the trunk from falling backward without any muscular contraction. This ligament is also facilitates sitting where the ligament relax causing the pelvic bone tilt backwards (1)

Adduction and internal rotation of the joint is caused by the iliofemoral ligament while the ischiofemoral ligament regulates rotation and the pubofemoral ligament being responsible abduction and internal rotation of the hip joint (10). The orbicularies is the most narrow ligament and is covered by the by the other ligaments and its major role is to maintain contact in the joint. This is due to its ability to act as a buttonhole on the head of the femur. During the extension of the joint, the three pairs of the ligaments become staut in order to stabilize the joint. This will also help in the reduction in the energy requirement of muscles during standing (11). The intracapsular ligament is attached to the acetabular notch and the fovea of the femur. This is the ligament which only stretches during the dislocation of the hip to prevent for further displacement at the joint. (1)

2.5.Nerves at the hip region

The coordination in the hip region is controlled by the central nervous system i.e. the brain and the spinal cord (8). There should be communication between the central nervous system and hip joint region. The hip joint is therefore supplied with nerves that transmit impulses from the muscles of the hip joint to the central nervous system and also transmitting the responses from the central nervous system to the muscles at the hip joint (8). The nerves that serve the hip region are the Superior clunial nerve, Middle clunial nerve, Inferior clunial nerve, Sciatic nerve, Posterior cutaneous nerve of the thigh, Superior

gluteal nervenamong others (12). These nerves run through different parts of the hip region supplying and transmitting impulses to the various parts of attachment. The superior clunial nerve, Middle clunial nerve, Inferior clunial nerve transmit nerves over the buttocks and majorly run through the lumbar spine (8).

The sciatic nerve on the other hand is the longest and widest nerve that branches from the plexus at the sacrum into the gluteal region. It therefore passes through the greater sciatic foramen. From the gluteal region, the nerve then passes into the biceps femoris before splitting into the tibial and fibula nevrves (12). The main role of the sciatic nerve is to innervate the muscles of the posterior femur. Superior gluteal nerve moves from the plexus in the sacrum into the gluteus medius and gluteus minimus through the greater sciatic foramen (8). The role of the posterior gluteal nerve innervates the muscles along the tensor fasciae latae at the hip region while the inferior gluteal nerve innervates the gluteus maximus as it runs from the plexus in the sacrum forming several branches. The posterior cutaneous nerve of the femur innervates the skin of the buttock, posterior femur and the calf of the leg as it passes through the greater sciatic foramen and the gluteus maximus into the tensor fasciae latae (8).

2.6.Arteries at the hip region

The muscles of the femur and the hip are actively contracting and relaxing and therefore require a lot of energy. There should therefore be the presence of blood vessels that supply the required nutrients and oxygen which are used in respiration. The blood vessels also transport the metabolic wastes from the muscles towards the excretory organs (13). The food materials and oxygen supplied by the blood vessels are therefore responsible for the nourishment of the muscle cells and the bone cells at the hip region (7). The hip muscles are therefore supplied by the arteries such as Obturator artery, Inferior gluteal artery, Internal pudendal artery, Perforating arteries, femoral artery, Deep femoral artery (profunda femoris artery), Lateral circumflex femoral artery, Medial circumflex femoral artery and the Superior gluteal artery which supply the various parts of the hip region (11).

The Superior gluteal artery which starts from the internal iliac artery into the gluteus minimus and gluteus medius muscles ssupply the gluteus minimus and medius muscles with nutrients and oxygen. The Inferior gluteal artery which also runs from the internal iliac

artery into the gluteal region supplies blood containing nutrients and oxygen to muscles at this region such as the quadratus femoris, gluteus maximus, hamstring muscles and obturator internus muscles. Internal pudendal artery on the other hand supplies blood to the external genitalia while the Perforating arteries supply blood to both the hamstring muscles and vastus lateralis (11).

The anterior and medial femur is supplied by the femoral artery which is an extension of the external iliac artery. The muscles of the femur are supplied by the Deep femoral artery (profunda femoris artery) while the anterior part of the gluteal region are supplied by the Lateral circumflex femoral artery (14). The head of the femur and the neck of the femur are supplied with nutrients and oxygen by the Medial circumflex femoral artery while the Obturator artery supplies blood to the muscles found near the ischium especially the ischial tuberosities the obturator externus, pectineus, adductors and gracilis parts of the hip region (7).

2.8.Fractures in Pelvis

At the base of the spine is a group of bones that are butterfly shaped. These bones include the pubis, Ilium and the ischum bones. These bones are held together by ligaments that form a girdle of bones. Fractures in the pelvis are not common and range from mild to severe fractures. Some of the fractures particularly mild fractures can heal within weeks without the need of surgery. Other severe fractures may be life threatening and can damage the organs protected by the pelvis. These fractures need immediate medical attention and could involve major surgical operations and lengthy rehabilitation and physical therapy. These two types of fractures can further be classified as stable and unstable pelvic fractures (14).

Stable pelvic fracture is one in which the pelvis has only one break point in the pelvic ring. There is limited bleeding and the bones remain intact in one place. On the other hand an unstable pelvic fracture in one in which the pelvic ring has two or more breaks. There is also moderate bleeding or even severe bleeding. The two types of pelvic fractures can further be classified as closed fractures if the skin is not broken and open fractures where the skin has been broken (9).

2.8.1.Fractures located in the Acetabulum of pelvis

To understand this type of pelvic fracture, we must first understand what an acetabulum of pelvis is. The acetabulum is the part of the pelvis that connects with the upper end of the thigh bone to create the Hip joint. The two bones conventionally fit together like a cup and ball. Where the ball freely rotates in the cup. The bones are lined with a cartilage at the meeting point so there is no friction between the surfaces when there is movement (16).

Common hip or pelvic fractures occur to the ball portion of the hip joint and can easily be identified and treated. The Acetabulum fracture occurs on the cup part of the hip joint in the pelvis. Fractures located at the acetabulum of pelvis are difficult to treat due to the fact that access to the acetabulum is difficult. It is even more difficult because of the acetabulum's proximity to the major blood vessels going to the legs, the intestines, the sciatic nerve, the urethra and the bladder. Therefore, to treat such a fracture, the orthopedic surgeon must fix the broken bones from the inside outwards (9).

Fractures to the acetabulum of the pelvis are mainly caused by high energy trauma from car accidents, motor cycle accidents and even industrial accidents in factories. In this type of fracture, the femoral head or the ball part of the hip joint is driven through the acetabulum courtesy of the impact of the accident or trauma cause. Sometimes in severe cases, the femoral head may burst through the acetabulum of the pelvis. In such cases, the hip is said to be dislocated. The patient may have both a fracture and a hip dislocation with significant bleeding and possibility of damage to the nervous structure. For this to happen there must have been a high force trauma to the patient (3).

It is unfortunate that patients who experience fractures in the acetabulum of the pelvis often have serious injuries and damages to other body tissues and neuro vascular structures that are supported by the pelvis (5).

Clinically, treatment of patients who have had a fracture to the acetabulum of the pelvis begins with the trauma team at the scene of the incident. The team assesses the situation and determines the severity of the injuries. The patient is then taken to the emergency room where a team of nurses, anesthesiologist and general surgeons work

together to control the bleeding of the patient, addresses chest and head damages and other injuries to other parts of the body that may have been affected by the trauma. Damages to the intestines, the bladder and bones are stabilized before any other further treatment is advanced to the patient (3).

During this early stage of treatment the orthopedic surgeon may need to stabilize the fracture in the pelvic region using an external frame to hold the bones in proper alignment. This is a temporary treatment to allow other treatments to be completed. This process is known as temporary external fixation. The external frame is constructed using steel pins inserted into the bone and joined using rods and clamps (4).

Once the patient is stabilized, and all the life threatening injuries have been treated, the treatment of the fractures to the acetabulum of the pelvis can then be treated. The treatment of this type of fracture requires the expertise of several specialists. The orthopedic surgeons must closely work with the trauma team to achieve successful results. More than often patients with such injuries are transferred to special hospitals with adequate and experienced personnel and machinery to effectively treat and monitor the patients (3).

2.8.2.Treatment of the fracture

The main goal of treating the fracture to the acetabulum is to reinstate the patient to the healthy state they were before the injury. This may not be fully achievable but the treatment aims to achieve this to the greatest possibility. The primary determinant to the achievement of this goal is to align the bones properly during the healing process (8).

Different approaches can be employed in the treatment of fracture to the acetabulum of the pelvis. The approach depends with the severity of the fracture. Generally treatment include nonsurgical treatment and the surgical treatment (4).

2.8.3.Non-surgical treatment

Patients may be treated using non surgical methods if the fracture is not too severe. This method is mainly applied to patients with stable fractures. The treatment method is applied to patient with no displacements and patients who may not be able to undergo surgery due to significant medical problems or patients with severe osteoporosis. Closed

reduction can be done through traction or manipulation after a patient is under anesthesia (2).

As with any fracture, the main goal of treatment for fractures of the acetabulum and pelvis is to return the patient to their pre-injury functional level, to the greatest extent possible. This means returning comfortably to daily activities--work and play. Physicians, nurses and rehabilitation specialists design a course of treatment that seeks to get the patient back to full strength and with the range of motion that they had before the injury (17).

Physical management

Usually this nonoperative treatment is recommended for patients with no displacements or minimal displacement like low anterior column or low transverse fractures, so the superior part of the acetabulum must be intact.
Early mobilization is necessary because prolonged recumbency can be life-threatening. Conservative treatment includes pain control, functional physical therapy and radiographic follow-up. Physical therapy include gait training, stabilization exercises and mobility training.

Patients who underwent an operation have to start with passive ROM exercises followed by active non weight bearing such as a series of flexion/extension . Partial weight-bearing with stepwise progression usually starts 6 weeks postoperatively and full weight bearing is eventually allowed at 10 weeks (18).

Physical therapy include gait training, stabilization exercises and mobility training. Early mobilization is very important. The patient must get out of the bed as soon as possible. Prolonged immobilization can lead to a number of complications including respiratory and circulatory compromise.

The intensity of the rehabilitation depends on whether the fracture was stable or unstable. The goals of the physical therapy program should be provide the patient with an optimal return of function by improving functional skills, self-care skills and safety awareness. In people with surgical treatment (ex: ORIF), after 1 or 2 days of bed rest physical therapy is initiated to begin transfer and exercise training. The short-term goals are independence with transfers and wheelchair mobility. After leaving the hospital it is easier for the patient that the physical therapist comes at home for an exercise program. The time to achieve this goals are from 2 to 6 weeks, depending on de medical status of the patient. The home exercise program include basic ROM and strengthening exercises intended to prevent contracture and reduce atrophy. The patient performs isometric exercises of the gluteal muscle and quadriceps femoris muscle, ROM exercises and upper-extremity resistive exercises (eg. Shoulder and elbow flexion and extension) until fatigued. The number of repetitions varied with every patient. The patient is still in an non-weight-bearing status.

Once weight-bearing is resumed, physical therapy consisted of gait training and resistive exercises for the trunk and extremities, along with cardiovascular exercises (eg. Treadmill or bicycle training). Aquatherapy is also good and helpful when available (19).

Rehabilitation Program

Acute Rehabilitation Services. All patients should have Physical and Occupational Therapy initiated immediately post-operatively or after the initiation of traction, to institute a program of bed level range of motion, strengthening and conditioning exercises. This program is taught to the patient, caregivers and nursing staff, so that it may be performed throughout the day. Patients in traction are continued with bed level activities until released for out of bed activity. Patients who are not limited by traction are mobilized out of bed to chair by the first post-operative day. Chair level exercises (e.g., active quadriceps exercises, ankle pumps) are implemented. On post-operative days 2-5 the program consists of; bed to chair mobility using a standing pivot transfer, wheelchair skills, pregait (e.g., sit to stand, standing balance and tolerance) and gait (parallel bars to walker to crutches) activities, bathroom skills, activities of daily living (ADL) training and continued performance of range of motion, strengthening and conditioning exercises. Advanced skills in transfers (tub, car), mobility (stairs) and ADL's are instituted by days 6-10 and equipment is procured (e.g., raised toilet seat, bathtub bench with hand-held shower, bathroom grab bars, long handled dressing and ADL devices, walker and/or rental wheelchair) in preparation for discharge. Outpatient or home health therapy (usually only physical therapy) is typically utilized for 2 to 8 weeks after discharge, to assist with the transition to home and advance mobility skills (eg., use of crutches or cane) and endurance (20).

Exercises may include the following The patient must be taught static quadriceps exercises preoperatively and must start them again postoperatively as soon as he or she is comfortable. The patient must also begin ankle mobilization and, especially, dorsiflexion exercises on postoperative day 1; this not only prevents the development of a postural foot drop but also helps in circulation of blood in the lower limb and guards against development of DVT. The patient should also begin with upper limb – strengthening exercises to make crutch walking easier during rehabilitation. Dynamic quadriceps exercises may be started as soon as the patient can sit up with his or her legs dangling by the side of the bed, usually in 5-7 days (21).

2.8.4.Surgical treatment

The orthopedic surgeon can do an open incision to directly manipulate the bone through open reduction to carry out bone realignment. The surgeon can also carry out a closed reduction where the no incision is required. After realignment of the bones, the surgeon can then use external or internal fixation to properly hold the bone in position during the healing process. Pins, wires, screws and plates are also used to hold the bones in position. The open reduction with internal fixation surgical method is done on patients who

have joint displacement. In this method, the surgeon reduces or realigns the bones as precisely as possible to prevent post injury problems commonly arthritis. Bones are then fixed with metal plates and screws to prevent displacements in the future and to commence rehabilitation (7).

The fractures to the acetabulum of the pelvis are not normally treated immediately. Treatment begins after 5- 10 days after the injury. This is because the patient is still experiencing significant bleeding. The treatment must be delayed until the patient's blood clotting has gone to effect (8).

2.8.5.Complications after fracture of the acetabulum of the pelvis

Patients who are confined to bed for long periods can develop pneumonia due to the inability to expand their lungs to the maximum as they normally do. The patients could also develop muscle complications due to long periods of inactivity (9).

Blood clots may also form in the veins of the thighs, pelvis and lower legs. These clots may travel to the lungs resulting in pulmonary embolism and deep vein thrombosis (11). Heterrotopic ossification may also result where bone forms in areas that should have muscle in the body.

Patients with a dislocated hip or acetabular fracture may experience disrupted blood flow to the head of the femur hence may result in collapse of hip joint and tissue (9).

2.8.6.Prognosis and precaution

With proper after care and physiotherapy, patients often fully recover from fractures to the acetabulum of the pelvis. This recovery is often dependent on the severity of the fracture and how well it is treated. Precautions must be taken to prevent further injuries. The patient must avoid heavy stress full work that may further worsen the fracture.

3. Special Part (Case Study)

3.1. Methodology

Clinical work I had with the patient, took place at Kladno Hospital in Kladno. Physiotherapy program started on Monday 13.7.2015 and ended on Friday 24.7.2015. For 10 days 8 hours daily with total amount 80 hours of practicing.

The clinical practice was supervised by Bc. Tomas Modlinger. Number of therapy sessions I had with patient 8 times.

The therapy procedures were applied in exercise room, most of therapies were manually, I used instruments and tools, soft ball for soft tissue techniques and decrease swelling, overball for ROM and strengthening exercises, redcord for ROM and strengthening exercises.
For examination I used goniometer for ROM examination, measurement tape for length and circumference of lower extremities.

Patient was using crutches for walking, but while we did posture examination patient was standing without crutches near to treatment table.

The work has been approved by the Ethics Committee of Faculty of Physical Education and Sport Chareles University.

3.2.Anamnesis

3.2.1.Personal anamnesis

Examined person L.M.

Date of birth 1979

Diagnosis

Patient after fracture of acetabulum on left side of pelvis, Code S3240

Subjective feeling of the patient

Patient feels pain on left knee joint 3 to 4/10 sometimes during the day when changing position or doing flexion of the knee. Decrease sensation in left leg on outer aspect of calf and medial aspect of the foot and no feeling on dorsum lateral and sole of the foot. Patient was afraid of loading on his left foot during standing and walking. Limitation of left knee flexion.

Allergies NO

Abuses

No smoking, social drinker

Hobbies

Motor bike riding, cycling and sport activities generally

3.2.2.History of the problem

In 17.3.2015, while patient is having special diet at that time, and because of hypoglycemia he lost his consciousness while he was riding his motor bike and driving it, then he fell down and accident happened

3.2.3

Injuries

Patient had fracture in right leg (lateral and medial malleolus and calcaneous), when patient was 17 years old, it was while patient having the military service in army, while some training

Operations NO

3.2.4.Family Anamnesis nothing important related to patient diagnosis

3.2.5.Medication

Aescin tbl p.o. x-1-1//1

Milgama tbl p.o. x-1-1//1

Tramal tbl p.o. x-0-1-1//0

3.2.6.Social Anamnesis

Patient lives in Vytovice, with his family, in flat on third floor without elevator, he is married and has three children

3.2.7.Statement from the patient's medical documentation

Patient was treated in another hospital, we don't have access to see his file

3.2.8.Previous rehabilitation

Patient had therapy after broken right leg (lateral and malleolus and calcaneous), in military institute. Therapy was for strengthening ankle plantar and dorsal flexors, stretching of triceps surrae, ROM exercises of foot in all directions (PF, DF, inversion and eversion). Patient doesn't have effect of this old injury now

3.2.9.Indication of rehabilitation

Supervisor was indicated to do therapy according to this indications

-Soft tissue techniques for scars, skin and fascia

-ROM exercises for hip and knee

-Mobilization of joints of lower extremity

- Strengthening and stimulation of weak muscles of lower extremity

-Stretching of shorten muscles

-Correct posture and gait

3.2.10.Differential diagnosis:

From the patient state I can say that because of his fractured left acetabulum and after three months of external fixation of left whole leg patient was having before and rupture of his left knee ligaments after the injury and limited ROM of left knee in flexion, all these result in weakness of left lower extremity muscles hip flexors iliopsoas, rectus femoris, Sartorius, tensor fasciae late, adductors longus and brevis, hip extensors gluteus maximus, hamstring knee extensors hamstring, gastrocnemius, ankle plantar gastrocnemius soleus plantaris tibialis posterior and dorsal flexors tibialis anteriorextensor digitorum longus. The faulty posture in standing and walking by slight elevated le pelvis, slight abducted left leg, slight flexion in left hip and slight rotation of trunk to left side which result is hypertonic quadratus lumborum iliopsoas, gluteus medius and minimus, and shorten of hip flexors iliopsoas rectus femoris, ankle plantar flexors gastrocnemius soleus and quadratus lumborum. There is restriction of joint play in IPJ, MPJ, patella, head of fibula, lisfranc's and chopart's. Due to partial damage of coomon peroneal nervis which affect motoric function of muscles DFrstibialis anterior, extensor digitorum longus, extensor halluces longus and brevis, and sensation on outer aspect of calf and dorsum of foot, and partial damage of tibial nerve which affect PFrs muscles gastrocnemius, soleus, plantaris, tibialis posterior, flexor digitorum longus, flexor halluces longus, and sensation on sole of foot.

3.2.11.Present state (Status presens)

Height: 186 cm Weight: 110 Kg BMI: 31.8 Blood Pressure: 117/70 Heart Pulse: 72

Patient is after around four months from the date when the accident happened on 17.3.2015. Patient had external fixation for whole left leg for three months which was removed on 16.6.2015. Patient was lying supine on bed, having swollen left foot and bandaged left heel due to decubitus in the heel from lying too long on bed. Patient is having pain in left knee due to confusion from the accident and that result in limitation of knee ROM in flexion direction and also rupture of all left knee ligaments. Patient is having limited ROM of left hip joint in flexion and extension, after fracture of left acetabulum of pelvis and three months of external fixation. Left foot is in plantar flexion and inversion

after partial damage of common peroneal and tibial nerves. Peroneal longus and brevis muscles were taking out on left leg. Patient is feeling good, no extreme pain of left knee or hip. Patient is walking on crutches independently which he already learned how to use it

3.3.Initial kinesiological examination

3.3.1. Aspection

Patient was lying supine on bed, with left foot in plantar and inversion position

Patient has four scars on left leg, anterior side of shin, medial side of calf, lateral side of shin and dorsal side of calf (under knee)

Three dots for the external fixation which was removed on anterior side of left thigh above left knee joint, and three dots on anterior left shin under left knee joint

There is wound on right thigh anterior aspect above right knee joint, which they took it's skin and put it on scar (medial of calf)

3.3.2.Posture

In standing position, without crutches, near to the treatment table

Back

lower right shoulder

rounded both shoulders

abducted left scapula

bigger thoracolumbar angle

elevated left pelvis

bigger volume of left leg (thigh and calf)

slight abducted left leg

popliteal line are symmetrical curved medially and downward (obliquely)

slight external rotated of right leg

left leg is stepped more forward than right leg (foot)

right achillis tendon is in normal shape and size no deviation, left one was covered by bandage

Lateral (Both side)

head is in neutral position

right shoulder is slight protracted

slight trunk rotation to left side

left leg is more forward than right one

contact of left foot on metatarsals and toes in plantar flexed and inversion position

Anterior

neutral position of head

left shoulder is lower

nipples are symmetrical

umbilicus is slightly shifted to left side

elevated left pelvis

slight abducted left leg

bigger volume of left leg (thigh and calf)

left leg is more forward than right one

position of left foot in plantar flexion and inversion

Position of pelvis

From examining the difference between PSISs, ASISs and iliac crests

There is elevation of the pelvis on left side

3.3.3.Gait

While patient is wearing shoes

Patient was walking on crutches independently, with slight protracted shoulders, slight stooped back (upper), with slight external rotated right leg, with slight abducted left leg, with no hip extension in left side, with slight flexion of left hip during walking. Contact of left foot on metatarsals and toes in plantar flexed and inversion position and is stepping on it and swing the right foot which is having good contact (heel, lateral aspect, medial aspect and end with toes off). The distance between steps are different where is patient

stepped with left leg (foot) then make step of right leg to be nearly in the same line as left foot was in stance phase

3.3.4 Soft tissue examination by Lewit

Skin and connective tissues of lower extremity (shin and calf)

On left shin and calf there is restriction in all directions (cranial, caudal, medial and lateral)

On left foot (dorsum) was restricted in all directions (cranial, caudal, medial and lateral)

Deep fascia of thigh

On both left and right side in both directions (medial and lateral) around axis of lower extremity

3.3.5.Examination of scar by Lewit (17)

Patient has four scars, all are healing and in good state, without stitches, warm and restricted in medial and lateral directions.

Anterior of shin, it's length 37 cm

Medial of calf, it's length 29 cm and size 4x15 cm, there is skin covered this scar was taken from right anterior side above knee

Lateral of shin, it's length 31 cm(posteriolateral)

Dorsal of calf (under knee), it's length 13 cm

There was slight swelling around scar (anterior one), there is no bleeding

3.3.6.Anthropometric Measurements:

The examinations were performed in lying position (supine)

Length

Lower Extremities	Left	Right
Functional length	91 cm	90 cm

Anatomical length	90 cm	91 cm

Table No.1 - Anthropometric measurement for length of lower extremity [cm]

Circumference

Lower Extremities	Left	Right
Around tarsal bones	30 cm	27 cm
Around calf	40 cm	44 cm
Around knee joint	46 cm	48 cm
Above knee joint	48 cm	48 cm
Under knee joint	45 cm	40 cm
Quadriceps 15 cm above knee joint	59 cm	58 cm
Vastus medialis 10 cm above knee joint	54 cm	54 cm

Table No.2 - Anthropometric measurement for circumference of lower extremity [cm]

3.3.7.Examination of muscle tone by Lewit:

Muscle	Position	Left side	Right side
Gluteal muscles (maximus, medius,minimus)	prone	hypotonic hypertonic	Normal Normal
Hamstring	prone	hypotonic	Normal
Adductors (magnus, longus, brevis)	supine	normal	Normal

Triceps surae	prone	hypertone	Normal
Abductors (tensor fascia lata)	supine	normal	Normal
Quadriceps femoris (rectus femoris, vastus medialis, intermedialis, lateralis)	supine	hypotonic normal	Normal
Iliopsoas	supine	hypertonic	Normal
Quadratus lumborum	prone	hypertonic	Normal

Table No.3 - Examination of muscle tone by Lewit

3.3.8.Joint Play Examination by Lewit:

Joints	**Left**	**Right**
Patella	Restricted in cranial and lateral direction	Restricted in lateral direction
Head of fibula	Examination in semi flexed knee 25. Restricted in ventral and dorsal directions	Restricted in dorsal direction
Talocrural	-	Not restricted
Subtalar	-	Not restricted
Talocalcaneonavicular	-	Not restricted

Chopart's	-	Not restricted
Lisfranc's	-	Not restricted
Metatarsophalangeal	Restricted 1-5 in caudal direction	Restricted 3,4 and 5 in plantar direction
Interphalangeal	Restricted 2-5 in proximal and distal phalanx in plantar and dorsal directions	Restricted in first phalanx in plantar direction

Table No.4 - Joint play examination by Lewit.

I forgot to examine joint play of sacroiliac joint in initial kinesiological examination, but I examine it and it was blocked on left side and I did mobilization by Lewit in last therapy session with patient.

3.3.9.ROM Examination by using goniometer

Joint/movement	**Left**	**Right**
Hip flexion Active Passive	90 100	105 120
Hip extension Active Passive	0 10	15 20
Hip abduction Active Passive	20 25	20 30
Hip adduction Active Passive	10 15	10 15

Hip internal rotation Active Passive	-	20 25
Hip external rotation Active Passive	-	35 40
Knee flexion in supine Active Passive in prone Active Passive	20 30 0 20	130 130 115 125
Knee extension Active Passive	0 5	0 5
Ankle plantar flexion Active Passive	45 45	45 45
Ankle dorsal flexion Active Passive	0 5	5 10

Table No.5 - ROM examination by goniometer [degrees]

Rotations in hip on left side were not done by goniometer (due to patient condition) while he

couldn't do knee flexion until 90 degrees. So we do it evaluational by semiflexed left knee, while patient is supine and when patient is standing shows that patient has restricted left hip ER, IR and knee F. Ankle PF 45 is the basic position of patient's left foot

3.3.10.Muscle Strength Test, by Kendall:

Muscles	**Left**	**Right**
Gluteal muscles (maximus, medius and minimus)	- 4	+4 5
Adductors (magnus, longus, brevis, pectineus, gracilis)	4	5
Abductors (TFL, gluteus medius, inimus)	5	5
Quadriceps muscles	+3	5
Hamstring	-	5
Hip flexors (iliopsoas)	5	5
Tibialis anterior	-	5
Extensor digitorum (longus and brevis)	1	5
Ankle plantar flexors (gastrocnemius, plantaris, flexor digitorum longus flexor halluces longus, soleus)	1 1 1 -	5 5 5 5

Table No.6 - Muscle strength test by Kendall

3.3.11.Muscle Length Test by Janda

Muscles	**Left**	**Right**
Hip flexors (iliopsoas, rectus femoris, TFL, pectenius, gracilis)	-	0
Hamstring	0	1
Quadriceps (rectus femoris)	-	0
Adductors (brevis, longus)	2	1
Quadratus lumborum	0	0
Ankle plantar flexors (soleus, gastrocnemius, plantaris)	2 2	1 0
Piriformis	1	1

Table No.7 - Muscle length test by Janda

Examination of piriformis muscle length in modified position with semiflexed left knee
The rest of examined muscles we were not able to do on left leg because limitation of knee flexion

3.3.12.Neurological Examinations

Slight Sensation	**Left**	**Right**
Outer aspect of calf L4	Decreased	Normal
Medial aspect of calf L5	Normal	Normal
Posterior of calf L4,5	Normal	Normal
Dorsum of foot L5	No sensation	Normal
Lateral aspect of dorsum S1	No sensation	Normal
Sole of foot S2	No sensation	Normal
Medial aspect of foot L4	Decreased	Normal

Table No.8 - Neurological examination (dermatomes)

I didn't more of neurological examination because I expect the same results

3.3.13.Examination of movement patten by Janda

Type of pattern	**Left**	**Right**
Hip extension	First contraction of hamstring, then, gluteals last is erector spinea and paravertebral muscles. There is contraction of muscles but no movement	First contraction of hamstring, then gluteal muscles last in erector spinea and paravertebral muscles. Movement in extension was good
Hip abduction	hip abduction with slight extension, not stabilized pelvis, tend to lateral flexed trunk	hip abduction with slight external rotation and flexion of hip

Table No. 9 - Evaluation of movement pattern by Janda

3.3.14.Conclusion of examination

Patient is feeling a pain in left knee sometimes during day or when changing position and after exercisiing around 3 to 4/10. Patient has faulty posture of standing with flexion of upper back, rounded shoulders, lower left shoulder, semi flexed and abducted left leg which is more forward than right one and stepped on metatarsals and toes due to his condition of left foot which is in plantar and inversion position, slight trunk rotation to left side and elevated pelvis to left side, gait also is not good with wider base of support contacting of left foot which is in the same position as in standing, stepp on left foot and swing right leg with shorter distance between steps while there is no hip extension on left side but there is semi flexed and abducted left hip and patient afraid to load on his left foot because of his condition, loading about 107 on left foot. Movement pattern is not good in hip abduction and extension on left side and in hip abduction on right side, pelvis is not fixed during the movement and there is compensation of movement by lateral flexed of trunk in left hip abduction. From ROM, there were restricted in hip F 125 on right side and 90 on left side, ABD 20 on boh side, IR , ER 20 and 35 on right side and on left side but we couldn't measure it due to patient condition, and in hip E 0 actively against gravity on left side, in F of both knees (limitation on left knee 20), in DF of both ankles. From palpation by Lewit, hypertonic QL and iliopsoas on left side,hypotonic gluteous maximus rectus femoris gastrocnemius and tibialis anterior on left leg. From MST, weak left gluteal muscles (maximus, medius, minimus), ankle plantar and dorsal flexors (grade 1 by Kendall) where there is only contraction without movement. From MLT, according Janda, On left leg, piriformis (grade 1), ADDrs an ankle PFrs (grade 2). On right leg, hamstring piriformis ankle PFrs and ADDrs (grade 1).

We assume for the muscles that we were not able to examine it's strength or length that there is weakness in most of left leg (ankle plantar and dorsal flexors, and shorten of most of left leg muscles, because the injury and the long time fixation of whole leg. From joint play by Lewit, restricted, L patella cranially and laterally, and R patella laterally, R fibula dorsally, and L fibula ventrally and dorsally, L IPJ 2-5 proximal and distal in plantar and dorsal directions, and R to/ IPJ first phalanx caudally, L MPJ 1-5 caudally, and R MPJ 3,4,5 caudally. From movement pattern by Janda, while providing hip extension, patient

was not able to do it anti gravity on left side and there was only contraction of muscles. From soft tissue examination, there was restriction of scars, connective tissues of shin and calf and under left knee in most of directions and in deep thigh fascia around axis of lower extremity

3.4.Short-term and long-term rehabilitation plans

3.4.1.Short term RHB

-Scar care

-Soft tissue techniques (stretching and manipulations of restricted skin, connective tissues of left leg)

-Increase ROM actively of restricted joints (knee flexion, hip flexion and extension)

-Lymphatic drainage for decreasing swelling on left leg (foot)

-Decrease swelling and edema of left leg (foot), by using antiedema soft ball

-Mobilization of restricted joints ankle, patella, head of fibula and small joints of foot

-Stretching of shorted muscles (adductors on both side, rectus femoris on left side, right hamstring, ankle plantar flexors)

-Activation of hypotonic muscles (most of muscles on left leg, rectus femoris, ankle plantar and dorsal flexors, left gluteus maximus)

-Stimulation of weak muscles (left ankle plantar and dorsal flexors), by using ES physical therapy

-Strengthening of weak muscles (quadriceps, gluteals maximus medius and minimus)

-PIR (post isometric relaxation) of hypertonic muscles (left quadratus lumborum and iliopsoas)

-Correct faulty posture and gait

3.4.2.Long term RHB

-Scar care

-Keep ROM exercising for restricted knee and both hips

-Correct patent posture and gait

-Relearning movement pattern of hip extension on left side

-Keep strengthening exercises for weak muscles of lower extremity

-Keep stimulation weak muscles of lower extremity

-Keep activation hypotonic muscles lower extremity

-Pre operation therapy, which patient will have due to his ruptured ligaments of left knee

3.5.Therapy Progress

Date 15.7.2015

Present state

Patient is after around four months from date of injury happened and after around one month after removal of external fixation for whole left leg which lasts for three months. Patient is feeling good no pain while lying supine on bed with left heel bandaged because of it's injury from lying too long on bed. left foot is swollen and in plantar and inversion position. Patient can walk using crutches independently

Goal of today's therapy unit

-Soft tissue techniques for left shin and calf, left foot (dorsum) deep fascia of thigh stretching on left side

-Scar care

-Mobilization of restricted patella and fibula in both side

-ROM exercises for knee and hip on left side

-Activation of hypotonic muscles of left leg

-Stretching of ankle plantar flexors of left leg

Procedure

-Stretching connective tissues fold By Lewit, in left calf and shin, by using both thumbs to take up the slack and hold after latency period the tissue fold will relaxed, applying this procedure on shin and calf in all restricted (cranial, caudal, side to side) directions

-stretching of deep thigh on left side around axis of lower extremity by holding the thigh volume by hand and roll it to the restricted direction and hold until release, while patient is supine with semi flexed left knee

-Scare care By Lewit, by using connective tissue fold, by pressing by both thumbs on scar from opposite directions S shape And by holding scar between both thumbs from one

direction and rest of fingers of both hands from opposite direction and creat C shape
And pressing directly by thumb on the scar
-Mobilization of restricted joint play By Lewit
mobilization of patella which is restricted in cranial and lateral directions on left side And in lateral direction of right patella
By holding patella between thumbs from on direction and by fingers from opposite direction and move it to restricted direction and hold it until release
mobilization of head of fibula on left side in posterior and anterior directions (with flexion of knee 20) and on right head of fibula restricted in dorsal direction
By holding the head of fibula thumb and forefinger and doing repetitive movement
-Activation of hypotonic muscles on left leg (quadriceps femoris, ankle plantar flexors and ankle dorsal flexors)) by using soft ball and press it and roll it
And by using fingers with rapid movements caudally to cranially (distally to proximally) direction
-Isometric contraction of quadriceps muscles while patient is supine, push knee against table into extension of knee and hold it for a while then relax it
Isometric contraction of quadriceps muscles while patient is supine, and small ball under left knee and doing extension of knee and hold it for a while then relax it
-ROM exercises of hip and knee joints in flexion on left side
By using Motor Splint
Knee flexion 38 for 30 minutes
By using small ball under distal calf (because of injured heel) and roll it in direction of flexion of knee and hip while patient is supine
-Stretching ankle plantar flexors, on left leg passively
By pushing foot of patient by physiotherapist into direction of dorsal flexion of ankle and hold it for approximately one minute then relax it

All exercises are done 3 times 10 repititions

Result

Patient was feeling good, with slight pain in knee while doing maximum flexion and changing position on table, we gain mobility in restricted joint play in patella, head of fibula and stretching connective tissues of calf and shin on left leg. Activation of hypotonic muscles (knee extensors, ankle plantar and dorsal flexors) of lower extremity on left leg

Self-therapy

We instruct patient to do the same exercises at bed during the day, and especially at the weekend when patient go home. We instruct him to do stretching of ankle plantar flexors on left leg , in standing position by shifting weight of body a bit forward on both foot while holding bar for example by both hands and to do this exercise in presence of somebody for safety

Date 16.7.2015

Present state

Patient is in good mood, feeling a bit pain in knee during the day, swollen foot still present. Patient was lying supine on bed with left heel bandaged because of it's injury and having the motor splint in the room, we went together to exercise room, patient was walking by him self on crutches with no change in gait from what we examined

Goal of today's therapy unit

-Correction of patient posture and gait

-Soft tissue techniques for left shin and calf, left foot (dorsum) deep fascia of thigh stretching on left side

-Scar care

-Antiedemaic therapy on left foot by using soft ball

-Mobilization of restricted joint play on left leg in

Interphalangeal joints second to fifth proximal and distal in dorsal and plantar direction

Metatarsophalangeal joints first to fifth caudally

-ROM exercises for knee and hip on left side, in flexion direction

ankle dorsal and plantar flexion

-Activation of hypotonic muscles of left leg
-Stretching of ankle plantar flexors of left leg
-Lymph drainage manually on left leg

Procedure

-Stretching connective tissues fold By Lewit, in left calf and shin, by using both thumbs to take up the slack and hold after latency period the tissue fold will relaxed, applying this procedure on shin and calf in all restricted (cranial, caudal, side to side) directions stretching of deep thigh on left side around axis of lower extremity by holding the thigh volume by hand and roll it to the restricted direction and hold until release, while patient is supine with semi flexed left knee

-Scare care By Lewit, by using connective tissue fold, by pressing by both thumbs on scar from opposite directions S shape

And by holding scar between both thumbs from one direction and rest of fingers of both hands from opposite direction and creat C shape

And pressing directly by thumb on the scar

-Mobilization of restricted joint play By Lewit

mobilization of IPJ, by holding the proximal part joint between thumb and forefinger and the same on the distal part of the joint and doing repetitive movements in direction of restriction

Mobilization of MTP joints, by holding metatarsal bone by one hand and between thumb and forefinger and other hand with thumb and flexed forefinger do distraction with slight plantar flexion

-Activation of hypotonic muscles on left leg (quadriceps femoris, ankle plantar flexors and ankle dorsal flexors)) by using soft ball and press it and roll it

And by using fingers with rapid movements caudally to cranially (distally to proximally) direction

-Antiedema in left foot, by using soft ball pressing it on dorsum of foot distally to proximally up to knee with respect of scars, while patient is supine and foot over the edge of table because injured heel of the patient

-Isometric contraction of quadriceps muscles while patient is supine, push knee against

table into extension of knee and hold it for a while then relax it

Isometric contraction of quadriceps muscles while patient is supine, and small ball under left knee and doing extension of knee and hold it for a while then relax it

-ROM exercises of hip and knee joints in flexion on left side

By using Motor Splint

Knee flexion 40 for 30 minutes

Ankle plantar and dorsal flexion (for first time), while patient is sitting with extended left knee, foot position in slight plantar flexion and inversion, for 20 minutes

Ankle PF 30 and DF 5

By using small ball under distal calf (because of injured heel) and roll it in direction of flexion of knee and hip while patient is supine

-Stretching ankle plantar flexors, on left leg passively

By pushing foot of patient by physiotherapist into direction of dorsal flexion of ankle and hold it for approximately one minute then relax it

-Lymph drainage manually for left leg to decrease swelling, before exercising by physiotherapist

while patient is supine on table, with extended both knees, physiotherapist start by pressing using finger of both hands on groin area (front medially of left thigh) to open lymphatic nodes with small circular movements from up to down till knee (medially) and then back up, continue with same

principle on calf and then foot

-Correction patient posture and walk, by instruct patient to keep back straight while standing and walking with relaxed shoulders, and walk with keeping that posture without elevating pelvis

All exercises are done 3 times 10 repetitions

Results

Patient was feeling a bit pain in knee when he try to do more flexion of left knee while doing ROM exercises, otherwise he was feeling good, from motor splint we can see slight improvement in knee flexion 40, and it was first day for patient to do ankle motor

splint in PF 30 and DF 5, patient is exercising well and he is doing his best, patient posture is slightly change by erecting his back in standing but because of his left foot position and load which around 10 to 15% he can't keep it, while walking we try to correct his walk to decrease pelvis elevation he try it but can't keep it

Self-therapy

We instruct patient to do the same exercises at bed during the day, and especially at the weekend when patient go home

We instruct him to do passive stretching of ankle plantar flexors on left leg , in sitting position by holding foot from sole and pull it by belt toward the body for around half minute then relax, while knees are extended

Date 17.7.2015

Present state

Patient is feeling good, no extreme pain, swollen foot still present but decreased. Patient was lying supine on bed with left heel bandaged because of it's injury, soft and connective tissues and scars are more mobile than first day therapy but we do it's therapy every day because it's one of the most important goals of therapy plan, patient was walking by him self on crutches with no change in gait because of his left foot and he is afraid to load on it more.

Goal of today's therapy unit

-Soft tissue techniques for left shin and calf, left foot (dorsum) deep fascia of thigh stretching on left side

-Scar care

-Antiedema on left foot by using soft ball

-Mobilization of restricted joint play on left patella in cranial and lateral direction

-ROM exercises for knee in flexion direction and hip in flexion and extension directions on left side, ankle dorsal and plantar flexion

-Activation of hypotonic muscles of left leg (knee extensors, ankle plantar and doral flexors)

-Stretching of ankle plantar flexors and rectus femoris on left leg

Procedure

-Stretching connective tissues fold By Lewit, in left calf and shin, by using both thumbs to take up the slack and hold after latency period the tissue fold will relaxed, applying this procedure on shin and calf in all restricted (cranial, caudal, side to side) directions stretching of deep thigh on left side around axis of lower extremity by holding the thigh volume by hand and roll it to the restricted direction and hold until release, while patient is supine with semi flexed left knee

-Scare care By Lewit, by using connective tissue fold, by pressing by both thumbs on scar from opposite directions S shape

And by holding scar between both thumbs from one direction and rest of fingers of both hands from opposite direction and creat C shape

And pressing directly by thumb on the scar

-Mobilization of restricted joint play on left patella in cranial and lateral direction

By holding patella between thumbs from on direction and by fingers from opposite direction and move it to restricted direction and hold it until release

-Activation of hypotonic muscles on left leg (quadriceps femoris, ankle plantar flexors and ankle dorsal flexors)) by using soft ball and press it and roll it

And by using fingers with rapid movements caudally to cranially (distally to proximally) direction

-Antiedema in left foot, by using soft ball pressing it on dorsum of foot distally to proximally up to knee with respect of scars, while patient is supine and foot over the edge of table because injured heel of the patient

-Isometric contraction of quadriceps muscles while patient is supine, push knee against table into extension of knee and hold it for a while then relax it

Isometric contraction of quadriceps muscles while patient is supine, and small ball under left knee and doing extension of knee and hold it for a while then relax it

-ROM exercises of hip, knee and ankle joints in flexion on left side

By using Motor Splint

Knee flexion 45 for 30 minutes

Ankle plantar and dorsal flexion, while patient is sitting with extended left knee, foot position in slight plantar flexion and inversion, for 20 minutes

Ankle PF 30 and DF 5

By using small ball under distal calf (because of injured heel) and roll it in direction of flexion of knee and hip while patient is supine

By using redcord, exercises for ROM in extension direction of left hip

patient was side lying on his right side on table, left leg was held in slight abduction by the red cord above ankle and above knee joints, then patient is providing hip extension

Then, while patient in the same position we ask him to do knee flexion actively as ROM exercises in direction of flexion of left knee joint

-Stretching ankle plantar flexors, on left leg passively

By pushing foot of patient into direction of dorsal flexion of ankle and hold it for approximately one minute then relax it

And we did stretching for left quadriceps (rectus femoris) as we assumed that it's shortent because of patient condition of knee limited flexion and long time fixation of leg, while patient is prone and doing maximum knee flexion actively and then hold it position and push it passively further for few seconds and then relax it

All exercises are done 3 times 10 repetitions

Results

Patient was feeling tired after training this day, because of increasing exercises and adding new ones, but he was doing his best. We noticed that there was slight improvement of left knee flexion 45 by using motor splint and in left hip extension, patient was providing hip extension and knee flexion on left side with slight pelvis rotation then we fix it toward table to control that undesirable movement. Patient was feeling pain in the knee while doing quadriceps stretching in prone position, and a little pain in hip while doing hip extension on left side by using red cord but he relax at bed

Self-therapy

We instruct patient to do the same exercises at bed during the day, and especially at the weekend when patient go home

We instruct him to do passive stretching of ankle plantar flexors on left leg , in sitting position by holding foot from sole and pull it by belt toward the body for around half minute then relax, while knees are extended.

And stretching of quadriceps muscles, while he is prone, doing maximum flexion of left knee and hold leg by belt above ankle and pull it toward his body for few seconds then relax it

Date 20.7.2015

Present state

Patient is feeling good, no extreme pain, swollen foot still present but decreased. Patient was lying supine on bed with left heel bandaged because of it's injury, soft and connective tissues and scars are more mobile than first day therapy but we do it's therapy every day because it's one of the most important goals of therapy plan, we noticed that there was slight improvement in flexion of left knee and in left hip extension patient was walking by him self on crutches with no change in gait because of his left foot and he is afraid to load on it more.

Goal of today's therapy unit

-Soft tissue techniques for left shin and calf, left foot (dorsum), under knee in cranial and lateral directions and deep fascia of thigh stretching on both side

-Scar care

-Antiedema on left foot by using soft ball

-Mobilization of restricted joint play on left patella in cranial and lateral direction and right patella in caudal direction, Interphalangeal joints third to fifth proximal and distal in dorsal and plantar direction, Metatarsophalangeal joints third to fifth caudally

-ROM exercises for knee in flexion direction and hip in flexion and extension directions on left side, ankle dorsal and plantar flexion

-Activation of hypotonic muscles of left leg (knee extensors, ankle plantar and doral flexors)

-Stretching of ankle plantar flexors and rectus femoris on left leg

-Lymph drainage manually on left leg

Procedure

-Lymph drainage manually for left leg to decrease swelling, before exercising by physiotherapist

while patient is supine on table, with extended both knees, physiotherapist start by pressing using finger of both hands on groin area (front medially of left thigh) to open lymphatic nodes with small circular movements from up to down till knee (medially) and then back up, continue with same

principle on calf and then foot

-Stretching connective tissues fold By Lewit, in left calf and shin, by using both thumbs to take up the slack and hold after latency period the tissue fold will relaxed, applying this procedure on shin and calf in all restricted (cranial, caudal, side to side) directions

stretching cutaneous tissues under left knee in cranial and lateral direction, while patient is prone, by pressing by fingers deeply and push toward the restricted direction and wait for release

stretching of deep thigh on left side around axis of lower extremity by holding the thigh volume by hand and roll it to the restricted direction and hold until release, while patient is supine with semi flexed left knee

-Scar care By Lewit, by using connective tissue fold, by pressing by both thumbs on scar from opposite directions S shape

And by holding scar between both thumbs from one direction and rest of fingers of both hands from opposite direction and creat C shape

And pressing directly by thumb on the scar

-Mobilization of restricted joint play By Lewit

mobilization of left patella in cranial and lateral direction, and right patella in caudal direction

By holding patella between thumbs from on direction and by fingers from opposite direction and move it to restricted direction and hold it until release

mobilization of IPJ, by holding the proximal part joint between thumb and forefinger and the same on the distal part of the joint and doing repetitive movements in direction of restriction

Mobilization of MTP joints, by holding metatarsal bone by one hand and between thumb and forefinger and other hand with thumb and flexed forefinger do distraction with slight plantar flexion

-Activation of hypotonic muscles on left leg (quadriceps femoris, ankle plantar flexors and ankle dorsal flexors)) by using soft ball and press it and roll it

And by using fingers with rapid movements caudally to cranially (distally to proximally) direction

-Antiedema in left foot, by using soft ball pressing it on dorsum of foot distally to proximally up to knee with respect of scars, while patient is supine and foot over the edge of table because injured heel of the patient

-Isometric contraction of quadriceps muscles while patient is supine, push knee against table into extension of knee and hold it for a while then relax it

Isometric contraction of quadriceps muscles while patient is supine, and small ball under left knee and doing extension of knee and hold it for a while then relax it

-ROM exercises of hip, knee and ankle joints in flexion on left side

By using Motor Splint

Knee flexion 45 for 30 minutes

Ankle plantar and dorsal flexion, while patient is sitting with extended left knee, foot position in slight plantar flexion and inversion, for 20 minutes

Ankle PF 30 and DF 5

By using small ball under distal calf (because of injured heel) and roll it in direction of flexion of knee and hip while patient is supine

By using redcord, exercises for ROM in extension direction of left hip

patient was side lying on his right side on table, left leg was held in slight abduction by the red cord above ankle and above knee joints, then patient is providing hip extension

Then, while patient in the same position we ask him to do knee flexion actively as ROM exercises in direction of flexion of left knee joint

-Stretching ankle plantar flexors, on left leg passively

By pushing foot of patient into direction of dorsal flexion of ankle and hold it for approximately one minute then relax it

And we did stretching for left quadriceps (rectus femoris) as we assumed that it's shortent because of patient condition of knee limited flexion and long time fixation of leg, while patient is prone and doing maximum knee flexion actively and then hold it position and push it passively further for few seconds and then relax it

All exercises are done 3 times 10 repetitions

Results

Patient was feeling a bit tired after exercising, but he gets used to new exercises were added before weekend and he was doing his best. We noticed that there was slight improvement of left knee flexion 45 by using motor splint and in left hip extension, we notice that the restricted joint play in patella and IPJ and MPJ were moveable after mobilization, and stretched deep thigh fascia on left leg, patient was providing hip extension and knee flexion on left side with slight pelvis rotation then we fix it toward table. Patient was feeling pain in the knee after exercises, and a little pain in hip while doing hip extension on left side by using redcord

Self-therapy

We instruct patient to do the same exercises at bed during the day, and especially at the weekend when patient go home

We instruct him to do passive stretching of ankle plantar flexors on left leg , in sitting position by holding foot from sole and pull it by belt toward the body for around half minute then relax, while knees are extended.

And stretching of quadriceps muscles, while he is prone, doing maximum flexion of left knee and hold leg by belt above ankle and pull it toward his body for few seconds then relax it

Date 21.7.2015

Present state

Patient is feeling good, no extreme pain, swollen foot still present but it's decreased. Patient was lying supine on bed with left heel bandaged because of it's injury, soft and connective tissues and scars are more mobile than first day therapy but we do it's therapy every day because it's one of the most important goals of therapy plan, we noticed that there was slight improvement in flexion of left knee and in left hip extension, there was restricted head of fibula in dorsal direction on right side and both dorsal and ventral directions on left side

Goal of today's therapy unit

-Soft tissue techniques for left shin and calf, left foot (dorsum), under knee in cranial and lateral directions and deep fascia of thigh stretching on both side

-Scar care

-Reduce edema on left foot by using soft ball

-Mobilization of restricted joint play on left head of fibula in both posterior and anterior directions and on right side in posterior direction

-ROM exercises for knee in flexion direction and hip in flexion, abduction and extension directions on left side, ankle dorsal and plantar flexion

-Activation of hypotonic muscles of left leg (knee extensors, ankle plantar and doral flexors)

Stretching of ankle plantar flexors and rectus femoris on left leg

Procedure

-Stretching connective tissues fold By Lewit, in left calf and shin, by using both thumbs to take up the slack and hold after latency period the tissue fold will relaxed, applying this procedure on shin and calf in all restricted (cranial, caudal, side to side) directions

stretching cutaneous tissues under left knee in cranial and lateral direction, while patient is prone, by pressing by fingers deeply and push toward the restricted direction and wait for release

stretching of deep thigh by Lewit on left side around axis of lower extremity by holding the thigh volume by hand and roll it to the restricted direction and hold until release, while

patient is supine with semi flexed left knee

-Scare care By Lewit, by using connective tissue fold, by pressing by both thumbs on scar from opposite directions S shape

And by holding scar between both thumbs from one direction and rest of fingers of both hands from opposite direction and creat C shape

And pressing directly by thumb on the scar

-Mobilization of restricted joint play By Lewit

mobilization of head of fibula on left side in posterior and anterior directions (with semi flexion of knee) and on right head of fibula restricted in posterior direction

By holding the head of fibula thumb and forefinger and doing repetitive movement restricted direction

-Activation of hypotonic muscles on left leg (quadriceps femoris, ankle plantar flexors and ankle dorsal flexors)) by using soft ball and press it and roll it

And by using fingers with rapid movements caudally to cranially (distally to proximally) direction

-Antiedema in left foot, by using soft ball pressing it on dorsum of foot distally to proximally up to knee with respect of scars, while patient is supine and foot over the edge of table because injured heel of the patient

-Isometric contraction of quadriceps muscles while patient is supine, push knee against table into extension of knee and hold it for a while then relax it

Isometric contraction of quadriceps muscles while patient is supine, and small ball under left knee and doing extension of knee and hold it for a while then relax it

-ROM exercises of hip, knee and ankle joints in flexion on left side

By using Motor Splint

Knee flexion 45 for 30 minutes

Ankle plantar and dorsal flexion, while patient is sitting with extended left knee, foot position in slight plantar flexion and inversion, for 20 minutes

Ankle PF 30 and DF 10

By using small ball under distal calf (because of injured heel) and roll it in direction of flexion of knee and hip while patient is supine

By using redcord, exercises for ROM in extension direction of left hip
patient was side lying on his right side on table, left leg was held in slight abduction by the red cord above ankle and above knee joints, then patient is providing hip extension
Then, while patient in the same position we ask him to do knee flexion actively as ROM exercises in direction of flexion of left knee joint
By using gravity
ROM and strengthening exercises for gluteal maximus in hip extension in left side, while patient is lying prone and doing hip extension actively by lifting whole leg with extended knee or semi flexed knee as patient could
And ROM exercises in abduction while patient side lying on right side and provide hip abduction against gravity
-Stretching ankle plantar flexors, on left leg passively
By pushing foot of patient into direction of dorsal flexion of ankle and hold it for approximately one minute then relax it
And we did stretching for left quadriceps (rectus femoris) as we assumed that it's shortent because of patient condition of knee limited flexion and long time fixation of leg, while patient is prone and doing maximum knee flexion actively and then hold it position and push it passively further for few seconds and then relax it

Results

Patient was not feeling pain, there were movement of head of fibula in both sides which were restricted, soft and connective tissues of foot and leg are getting more mobile each day, decreasing of left foot swelling, there is improvement in knee flexion actively and hip flexion and extension and in DF 10 by using ankle motor splint, it was first day to do hip abduction exercises, patient gets used to most of exercises and doing most of them well, there is more stretched left quadriceps and plantar flexors of left ankle, there is more activation of muscles of left leg

Self-therapy

We instruct patient to do the same exercises at bed during the day, and especially at the weekend when patient go home. We instruct him to do passive stretching of ankle

plantar flexors on left leg , in sitting position by holding foot from sole and pull it by belt toward the body for around half minute then relax, while knees are extended.
And stretching of quadriceps muscles, while he is prone, doing maximum flexion of left knee and hold leg by belt above ankle and pull it toward his body for few seconds then relax it. And for ROM and strengthening exercises for gluteal maximus in hip extension in left side, patient can stand holding bar and doing hip extension actively, or by doing that while patient is prone and lifting whole leg with extended knee or semi flexed knee as patient could. And ROM exercises in abduction while patient side lying on right side and provide hip abduction against gravity

Date 22.7.2015

Present state

Patient is feeling good, no extreme pain, swollen foot still present but it's decreased each day. Patient was lying supine on bed with left heel bandaged because of it's injury, soft and connective tissues and scars are more mobile than first day therapy but we do it's therapy every day because it's one of the most important goals of therapy plan, we noticed that there was improvement in flexion of left knee and in left hip flexion and extension, there was no restricted joints play of lower extremities, we can notice better activation of left lower extremity muscles (knee extensors, ankle plantar and dorsal flexors),

Goal of today's therapy unit

-Lymph drainage manually on left leg to decrease swelling (foot)
-Soft tissue techniques for left shin and calf, left foot (dorsum), under knee in cranial and lateral directions and deep fascia of thigh stretching on both side
-Scar care
-Antiedema on left foot by using soft ball
-ROM exercises for knee in flexion direction and hip in flexion, abduction and extension directions on left side, ankle dorsal and plantar flexion
-Activation of hypotonic muscles of left leg (knee extensors, ankle plantar and doral flexors)
-Stimulation of lower extremity muscles by using physical therapy electrical stimulation
-Stretching of ankle plantar flexors and rectus femoris on left leg, and right hamstring

muscle, and both adductors muscles

Procedure

-Lymph drainage manually before exercising by physiotherapist

while patient is supine on table, with extended both knees, physiotherapist start by pressing using finger of both hands on groin area (front medially of left thigh) to open lymphatic nodes with small circular movements from up to down till knee (medially) and then back up, continue with same

principle on calf and then foot

-Stretching connective tissues fold By Lewit, in left calf and shin, by using both thumbs to take up the slack and hold after latency period the tissue fold will relaxed, applying this procedure on shin and calf in all restricted (cranial, caudal, side to side) directions

stretching cutaneous tissues under left knee in cranial and lateral direction, while patient is prone, by pressing by fingers deeply and push toward the restricted direction and wait for release

stretching of deep thigh by Lewit on left side around axis of lower extremity by holding the thigh volume by hand and roll it to the restricted direction and hold until release, while patient is supine with semi flexed left knee

-Scare care By Lewit, by using connective tissue fold, by pressing by both thumbs on scar from opposite directions S shape

And by holding scar between both thumbs from one direction and rest of fingers of both hands from opposite direction and creat C shape

And pressing directly by thumb on the scar

-Activation of hypotonic muscles on left leg (quadriceps femoris, ankle plantar flexors and ankle dorsal flexors)) by using soft ball and press it and roll it

And by using fingers with rapid movements caudally to cranially (distally to proximally) direction

-Antiedema in left foot, by using soft ball pressing it on dorsum of foot distally to proximally up to knee with respect of scars, while patient is supine and foot over the edge of table because injured heel of the patient

-Isometric contraction of quadriceps muscles while patient is supine, push knee against table into extension of knee and hold it for a while then relax it

Isometric contraction of quadriceps muscles while patient is supine, and small ball under left knee and doing extension of knee and hold it for a while then relax it

-ROM exercises of hip, knee and ankle joints in flexion on left side

By using Motor Splint

Knee flexion 45 for 30 minutes

Ankle plantar and dorsal flexion, while patient is sitting with extended left knee, foot position in slight plantar flexion and inversion, for 20 minutes

Ankle PF 30 and DF 5

By using small ball under distal calf (because of injured heel) and roll it in direction of flexion of knee and hip while patient is supine

By using redcord, exercises for ROM in extension direction of left hip

patient was side lying on his right side on table, left leg was held in slight abduction by the red cord above ankle and above knee joints, then patient is providing hip extension

Then, while patient in the same position we ask him to do knee flexion actively as ROM exercises in direction of flexion of left knee joint

By using gravity

ROM and strengthening exercises for gluteal maximus muscle in hip extension in left side, while patient is lying prone and doing hip extension actively by lifting whole leg with extended knee or semi flexed knee as patient could

And doing bridging exercise, while patient is supine, left leg semi flexed on medicine ball and control it by holding it, while other leg is flexed at knee and hip, elevating pelvis upward and contracting gluteal muscles

And ROM exercises in abduction while patient side lying on right side and provide hip abduction against gravity

-PIR for hypertonic muscles on left side

classically for quadratus lumborum muscle, while patient is sitting on table, right leg flexed over the edge of table and left leg on a chair in semi flexion, holding pelvis from both side by both hand, then ask patient to lean to right side to take the slack up, then looking upward and inhale hold then look down and exhale for relaxation, three to five times.

antigravity for iliopsoas muscle, in modified position because of limited knee flexion on left leg, patient is lying on back at the edge of table withdrawing right leg flexed in knee and hip toward body, while left foot on a chair with semi flexion in knee joint, we ask patient to lift leg a bit upward while breathing in hold then breath out and relax, it could be repeated till five times

-Stretching ankle plantar flexors, on left leg passively

By pushing foot of patient into direction of dorsal flexion of ankle and hold it for approximately one minute then relax it

And we did stretching for left quadriceps (rectus femoris) as we assumed that it's shortent because of patient condition of knee limited flexion and long time fixation of leg, while patient is prone and doing maximum knee flexion actively and then hold it position and push it passively further for few seconds and then relax it

stretching of right hamstring, while patient is supine, lift his right leg with extended knee to maximum flexion of right hip and by using belt around his foot and heel pull it toward his body and hold for a while then relax it

-Stimulation of lower extremity muscles by using physical therapy electrical stimulation, after therapy

electrodes located on

red electrode on tibialis anterior m. (lateral aspect calf)

black electrode on abductor hallucis (medial aspect of foot)

frequency 1000 Hz, intensity supra threshold, 200 ms impulse 100 ms pause, duration 5 minutes

All exercises are done 3 times 10 repetitions

Results

Patient was not feeling pain, there were no restricted joint play in both legs joints, soft and connective tissues of foot and leg are getting more mobile each day, decreasing of left foot swelling, there is improvement in knee flexion actively and hip flexion and extension, it was first day to do hip abduction exercises, patient gets used to most of exercises and doing most of them well, there is more stretched left quadriceps and plantar

flexors of left ankle, there is more activation of muscles of left leg, it was first day patient had physical therapy (ES) on muscles tibialis anterior and abductor halluces

Self-therapy

We instruct patient to do the same exercises at bed during the day, and especially at the weekend when patient go home. We instruct him to do passive stretching of ankle plantar flexors on left leg , in sitting position by holding foot from sole and pull it by belt toward the body for around half minute then relax, while knees are extended.
And stretching of quadriceps muscles, while he is prone, doing maximum flexion of left knee and hold leg by belt above ankle and pull it toward his body for few seconds then relax it. Stretching of right hamstring, while patient is supine, lift his right leg with extended knee to maximum flexion of right hip and by using belt around his foot and heel pull it toward his body and hold for a while then relax it. And for ROM and strengthening exercises for gluteal maximus in hip extension in left side, patient can stand holding bar and doing hip extension actively, or by doing that while patient is prone and lifting whole leg with extended knee or semi flexed knee as patient could. And ROM exercises in abduction while patient side lying on right side and provide hip abduction against gravity PIR for hypertonic muscles on left side, antigravity for iliopsoas muscle, in modified position because of limited knee flexion on left leg, patient is lying on back at the edge of table withdrawing right leg flexed in knee and hip toward body, while left foot on a chair with semi flexion in knee joint, we ask patient to lift leg a bit upward while breathing in hold then breath out and relax, it could be repeated till five times

Date 23.7.2015

Present state

Patient is feeling good, no extreme pain, swollen foot still present but it’s decreased each day. Patient was lying supine on bed with left heel bandaged because of it's injury, soft and connective tissues and scars are more mobile than first day therapy but we do it’s therapy every day because it’s one of the most important goals of therapy plan, but we found restricted deep fascia of left thigh around axis of lower extremity in both directions side to side, we noticed that there was improvement in flexion of left knee and in left hip

flexion and extension, there was restricted joints play of left patella in medial and lateral directions and in left fibula in anterior direction, we can notice better activation of left lower extremity muscles (knee extensors, ankle plantar and dorsal flexors)

Goal of today's therapy unit

-Soft tissue techniques for left shin and calf, left foot (dorsum), under knee in cranial and lateral directions and deep fascia of thigh stretching on both side

-Scar care

-Reduce edema on left foot by using soft ball

-Mobilization of restricted joint play By Lewit, mobilization of patella which is restricted in medial and lateral directions on left side and in left fibula in anterior direction

-ROM exercises for knee in flexion direction and hip in flexion, abduction and extension directions on left side, ankle dorsal and plantar flexion

-Activation of hypotonic muscles of left leg (knee extensors, ankle plantar and doral flexors)

-Stimulation of lower extremity muscles by using physical therapy electrical stimulation

-PIR of hypertonic muscles (quadratus lumborum, iliopsoas) on left side

-Stretching of ankle plantar flexors and quadriceps femoris on left leg and adductors muscles on both legs, and right hamstring muscle

Procedure

-Stretching connective tissues fold By Lewit, in left calf and shin, by using both thumbs to take up the slack and hold after latency period the tissue fold will relaxed, applying this procedure on shin and calf in all restricted (cranial, caudal, side to side) directions stretching cutaneous tissues under left knee in all direction, while patient is prone, by pressing by fingers deeply and push toward the restricted direction and wait for release stretching of deep thigh by Lweit on left side around axis of lower extremity by holding the thigh volume by hand and roll it to the restricted direction and hold until release, while patient is supine with semi flexed left knee

-Scare care By Lewit, by using connective tissue fold, by pressing by both thumbs on scar from opposite directions S shape

And by holding scar between both thumbs from one direction and rest of fingers of both hands from opposite direction and creat C shape

And pressing directly by thumb on the scar

-Mobilization of restricted joint play By Lewit

mobilization of patella which is restricted in medial and lateral directions on left side

By holding patella between thumbs from on direction and by fingers from opposite direction and move it to restricted direction and hold it until release

mobilization of head of fibula on left side in anterior direction (with semiflexed knee)

By holding the head of fibula thumb and forefinger and doing repetitive movement restricted direction

Activation of hypotonic muscles on left leg (quadriceps femoris, ankle plantar flexors and ankle dorsal flexors)) by using soft ball and press it and roll it

And by using fingers with rapid movements caudally to cranially (distally to proximally) direction

-Antiedema in left foot, by using soft ball pressing it on dorsum of foot distally to proximally up to knee with respect of scars, while patient is supine and foot over the edge of table because injured heel of the patient

-Isometric contraction of quadriceps muscles while patient is supine, push knee against table into extension of knee and hold it for a while then relax it

Isometric contraction of quadriceps muscles while patient is supine, and small ball under left knee and doing extension of knee and hold it for a while then relax it

-ROM exercises of hip, knee and ankle joints in flexion on left side

By using Motor Splint

Knee flexion 50 for 30 minutes

Ankle plantar and dorsal flexion, while patient is sitting with extended left knee, foot position in slight plantar flexion and inversion, for 20 minutes

Ankle PF 30 and DF 15

By using small ball under distal calf (because of injured heel) and roll it in direction of flexion of knee and hip while patient is supine

By using redcord, exercises for ROM in extension direction of left hip
patient was side lying on his right side on table, left leg was held in slight abduction by the red cord above ankle and above knee joints, then patient is providing hip extension
Then, while patient in the same position we ask him to do knee flexion actively as ROM exercises in direction of flexion of left knee joint
By using gravity
ROM and strengthening exercises for gluteal maximus muscle in hip extension in left side, while patient is lying prone and doing hip extension actively by lifting whole leg with extended knee or semi flexed knee as patient could
And doing bridging exercise, while patient is supine, left leg semi flexed on medicine ball and control it by holding it, while other leg is flexed at knee and hip, elevating pelvis upward and contracting gluteal muscles
And ROM exercises in abduction while patient side lying on right side and provide hip abduction against gravity
-PIR for hypertonic muscles on left side
classically for quadratus lumborum muscle, while patient is sitting on table, right leg flexed over the edge of table and left leg on a chair in semi flexion, holding pelvis from both side by both hand, then ask patient to lean to right side to take the slack up, then looking upward and inhale hold then look down and exhale for relaxation, three to five times could be repeated
antigravity for iliopsoas muscle, in modified position because of limited knee flexion on left leg, patient is lying on back at the edge of table withdrawing right leg flexed in knee and hip toward body, while left foot on a chair with semi flexion in knee joint, we ask patient to lift leg a bit upward while breathing in hold then breath out and relax, it could be repeated till five times
-Stretching ankle plantar flexors, on left leg passively
By pushing foot of patient into direction of dorsal flexion of ankle and hold it for approximately one minute then relax it
And we did stretching for left quadriceps (rectus femoris) as we assumed that it's shortent because of patient condition of knee limited flexion and long time fixation of leg, while patient is prone and doing maximum knee flexion actively and then hold it position and

push it passively further for few seconds and then relax it

Passive stretching for left and right adductors muscles

while patient is supine, hold his leg under knee (distal posterior thigh) and calf on therapist forearm, providing abduction in hip and hold it at maximum abduction for less than one minute and then relax it

stretching of right hamstring, while patient is supine, lift his right leg with extended knee to maximum flexion of right hip and by using belt around his foot and heel pull it toward his body and hold for a while then relax it

-Stimulation of lower extremity muscles by using physical therapy electrical stimulation, after therapy

electrodes located on

red electrode on tibialis anterior m. (lateral aspect calf)

black electrode on abductor hallucis (medial aspect of foot)

frequency 1000 Hz, intensity supra threshold, 200 ms impulse 100 ms pause, duration 5 minutes

All exercises are done 3 times 10 repetitions

Results

Patient was not feeling pain, there were mobilized joint play in left patella and head of fibula, soft and connective tissues of foot and leg are getting more mobile each day, stretched deep thigh fascia on left leg around axis of lower extremity, decreasing of left foot swelling, there is improvement in knee flexion actively and by using motor splint knee F 50 and improvement of hip flexion and extension, there is also improvement in ankle DF 15 while using ankle motor splint, patient gets used to most of exercises and doing most of them well, there is more stretched left quadriceps and plantar flexors of left ankle, there is more activation of muscles of left leg

Self-therapy

We instruct patient to do the same exercises at bed during the day, and especially at the weekend when patient go home. We instruct him to do passive stretching of ankle plantar flexors on left leg , in sitting position by holding foot from sole and pull it by belt

toward the body for around half minute then relax, while knees are extended.
And stretching of quadriceps muscles, while he is prone, doing maximum flexion of left knee and hold leg by belt above ankle and pull it toward his body for few seconds then relax it, stretching of right hamstring, while patient is supine, lift his right leg with extended knee to maximum flexion of right hip and by using belt around his foot and heel pull it toward his body and hold for a while then relax it. And for ROM and strengthening exercises for gluteal maximus in hip extension in left side, patient can stand holding bar and doing hip extension actively, or by doing that while patient is prone and lifting whole leg with extended knee or semi flexed knee as patient could. And ROM exercises in abduction while patient side lying on right side and provide hip abduction against gravity PIR for hypertonic muscles on left side, antigravity for iliopsoas muscle, in modified position because of limited knee flexion on left leg, patient is lying on back at the edge of table withdrawing right leg flexed in knee and hip toward body, while left foot on a chair with semi flexion in knee joint, we ask patient to lift leg a bit upward while breathing in hold then breath out and relax, it could be repeated till five times

Date 24.7.2015

Present state

Patient is feeling good, no extreme pain, swollen foot was notably decreased. Patient was lying supine on bed with left heel bandaged because of it's injury, soft and connective tissues and scars are more mobile than beginning of therapy, deep thigh fascia was not restricted, we noticed that there was improvement in flexion of left knee and in left hip flexion and extension, there was restricted sacroiliac joint play on left side, we can notice better activation of left lower extremity muscles (knee extensors, ankle plantar and dorsal flexors), patient sensation is better in some areas which were decreased in sensation

Goal of today's therapy unit

-Lymph drainage manually for left leg (foot) to decrease swelling
-Soft tissue techniques for left shin and calf, left foot (dorsum), under knee in cranial and lateral directions and deep fascia of thigh stretching on both side
-Scar care

-Reduce edema on left foot by using soft ball
-Mobilization of restricted joint play by Lewit, mobilization of sacroiliac joint on left side
-ROM exercises for knee in flexion direction and hip in flexion, abduction and extension directions on left side, ankle dorsal and plantar flexion
-Activation of hypotonic muscles of left leg (knee extensors, ankle plantar and doral flexors)
-Stimulation of lower extremity muscles by using physical therapy electrical stimulation
-PIR of hypertonic muscles (quadratus lumborum, iliopsoas) on left side
-Stretching of ankle plantar flexors and quadriceps femoris on left leg, and adductors muscles on both legs, and right hamstring

Procedure

-Lymph drainage manually before exercising by physiotherapist
while patient is supine on table, with extended both knees, physiotherapist start by pressing using finger of both hands on groin area (front medially of left thigh) to open lymphatic nodes with small circular movements from up to down till knee (medially) and then back up, continue with same
principle on calf and then foot
-Stretching connective tissues fold By Lewit, in left calf and shin, by using both thumbs to take up the slack and hold after latency period the tissue fold will relaxed, applying this procedure on shin and calf in all restricted (cranial, caudal, side to side) directions
stretching cutaneous tissues under left knee in all direction, while patient is prone, by pressing by fingers deeply and push toward the restricted direction and wait for release
-Scare care By Lewit, by using connective tissue fold, by pressing by both thumbs on scar from opposite directions S shape
And by holding scar between both thumbs from one direction and rest of fingers of both hands from opposite direction and creat C shape
And pressing directly by thumb on the scar
-Mobilization of restricted left sacroiliac joint play By Lewit

-Activation of hypotonic muscles on left leg (quadriceps femoris, ankle plantar flexors and ankle dorsal flexors)) by using soft ball and press it and roll it

And by using fingers with rapid movements caudally to cranially (distally to proximally) direction

-Antiedema in left foot, by using soft ball pressing it on dorsum of foot distally to proximally up to knee with respect of scars, while patient is supine and foot over the edge of table because injured heel of the patient

-Isometric contraction of quadriceps muscles while patient is supine, push knee against table into extension of knee and hold it for a while then relax it

Isometric contraction of quadriceps muscles while patient is supine, and small ball under left knee and doing extension of knee and hold it for a while then relax it

-ROM exercises of hip, knee and ankle joints in flexion on left side

By using Motor Splint

Knee flexion 55 for 30 minutes

Ankle plantar and dorsal flexion, while patient is sitting with extended left knee, foot position in slight plantar flexion and inversion, for 20 minutes

Ankle PF 30 and DF 15

By using small ball under distal calf (because of injured heel) and roll it in direction of flexion of knee and hip while patient is supine

By using redcord, exercises for ROM in extension direction of left hip

patient was side lying on his right side on table, left leg was held in slight abduction by the red cord above ankle and above knee joints, then patient is providing hip extension

Then, while patient in the same position we ask him to do knee flexion actively as ROM exercises in direction of flexion of left knee joint

By using gravity

ROM and strengthening exercises for gluteal maximus muscle in hip extension in left side, while patient is lying prone and doing hip extension actively by lifting whole leg with extended knee or semi flexed knee as patient could

And doing bridging exercise, while patient is supine, left leg semi flexed on medicine ball and control it by holding it, while other leg is flexed at knee and hip, elevating pelvis upward and contracting gluteal muscles

And ROM exercises in abduction while patient side lying on right side and provide hip abduction against gravity

-PIR for hypertonic muscles on left side

classically for quadratus lumborum muscle, while patient is sitting on table, right leg flexed over the edge of table and left leg on a chair in semi flexion, holding pelvis from both side by both hand, then ask patient to lean to right side to take the slack up, then looking upward and inhale hold then look down and exhale for relaxation, three to five times could be repeated, antigravity for iliopsoas muscle, in modified position because of limited knee flexion on left leg, patient is lying on back at the edge of table withdrawing right leg flexed in knee and hip toward body, while left foot on a chair with semi flexion in knee joint, we ask patient to lift leg a bit upward while breathing in hold then breath out and relax, it could be repeated till five times

-Stretching ankle plantar flexors, on left leg passively

By pushing foot of patient into direction of dorsal flexion of ankle and hold it for approximately one minute then relax it

And we did stretching for left quadriceps (rectus femoris) as we assumed that it's shortent because of patient condition of knee limited flexion and long time fixation of leg, while patient is prone and doing maximum knee flexion actively and then hold it position and push it passively further for few seconds and then relax it

Passive stretching for left and right adductors muscles

while patient is supine, hold his leg under knee (distal posterior thigh) and calf on therapist forearm, providing abduction in hip and hold it at maximum abduction for less than one minute and then relax it

stretching of right hamstring, while patient is supine, lift his right leg with extended knee to maximum flexion of right hip and by using belt around his foot and heel pull it toward his body and hold for a while then relax it

-Stimulation of lower extremity muscles by using physical therapy electrical stimulation, after therapy

electrodes located on

red electrode on tibialis anterior m. (lateral aspect calf)

black electrode on abductor hallucis (medial aspect of foot)

frequency 1000 Hz, intensity supra threshold, 200 ms impulse 100 ms pause, duration 5 minutes

All exercises are done 3 times 10 repetitions

Results

Patient was not feeling pain, there was no blockage sacroiliac joint play on both side, soft and connective tissues of foot and leg are getting more mobile each day, decreasing of left foot swelling, there is improvement in knee flexion actively and by using motor splint knee F 55 and improvement of hip flexion and extension, patient gets used to most of exercises and doing most of them well, there is more stretched left quadriceps and plantar flexors of left ankle and both adductors and right hamstring, there is more activation of muscles of left leg, patient sensation is better in some areas which were decreased

Self-therapy

We instruct patient to do the same exercises at bed during the day, and especially at the weekend when patient go home. We instruct him to do passive stretching of ankle plantar flexors on left leg , in sitting position by holding foot from sole and pull it by belt toward the body for around half minute then relax, while knees are extended.. And stretching of quadriceps muscles, while he is prone, doing maximum flexion of left knee and hold leg by belt above ankle and pull it toward his body for few seconds then relax it stretching of right hamstring, while patient is supine, lift his right leg with extended knee to maximum flexion of right hip and by using belt around his foot and heel pull it toward his body and hold for a while then relax it. And for ROM and strengthening exercises for gluteal maximus in hip extension in left side, patient can stand holding bar and doing hip extension actively, or by doing that while patient is prone and lifting whole leg with extended knee or semi flexed knee as patient could. And ROM exercises in abduction while patient side lying on right side and provide hip abduction against gravity. PIR for left hypertonic iliopsoason, antigravitv in modified position because of limited knee flexion on left leg, patient is lying on back at the edge of table withdrawing right leg flexed in knee and hip toward body, while left foot on a chair with semi flexion in knee joint, we ask patient to lift leg a bit upward while breathing in hold and breath out relax,

3.6.Final kinesiologic examination

3.6.1.Aspection

Patient was lying supine on bed, with left foot in plantar and inversion position
Patient has four scars on left leg, anterior side of shin, medial side of calf, lateral side of shin and dorsal side of calf (under knee)
Three dots for the external fixation which was removed on anterior side of left thigh above left knee joint, and three dots on anterior left shin under left knee joint
There is wound on right thigh anterior aspect above right knee joint, which they took it's skin and put it on scar (medial of calf)

3.6.2.Posture

In standing position, without crutches, near to the treatment table

Back

lower right shoulder
rounded both shoulders
abducted left scapula
bigger thoracolumbar angle
elevated left pelvis
bigger volume of left leg (thigh and calf)
slight abducted left leg
popliteal line are symmetrical curved medially and downward (obliquely)
slight external rotated of right leg
left leg is stepped more forward than right leg (foot)
right achillis tendon is in normal shape and size no deviation, left one was covered by bandage

Lateral (Both side)

head is in neutral position
right shoulder is slight protracted
slight trunk rotation to left side
left leg is more forward than right one

contact of left foot on metatarsals and toes in plantar flexed and inversion position

Anterior

neutral position of head

left shoulder is lower

nipples are symmetrical

umbilicus is slightly shifted to left side

elevated left pelvis

slight abducted left leg

bigger volume of left leg (thigh and calf)

left leg is more forward than right one

position of left foot in plantar flexion and inversion

Position of pelvis

From examining the difference between PSISs, ASISs and iliac crests

There is elevation of the pelvis on left side

3.6.3.Gait

While patient is wearing shoes

Patient was walking on crutches independently, with slight protracted shoulders, slight stooped back (upper), with slight external rotated right leg, with slight abducted left leg, with no hip extension in left side, with slight flexion of left hip during walking. Contact of left foot on metatarsals and toes in plantar flexed and inversion position and is stepping on it and swing the right foot which is having good contact (heel, lateral aspect, medial aspect and end with toes off). The distance between steps are different where is patient stepped with left leg (foot) then make step of right leg to be nearly in the same line as left foot was in stance phase

3.6.4.Soft tissue examination by Lewit:

Skin and connective tissues of lower extremity (shin and calf)

On left shin and calf there is slight restriction in all directions

On left foot (dorsum), less restricted than before

Deep fascia of thigh

On both left and right side there is no restriction

3.6.5.Examination of scar by Lewit

Patient has four scars, all are healing and in good state, without stitches, warm and restricted

Anterior of shin, it's length 37 cm

Medial of calf, it's length 29 cm and size 4x15 cm, there is skin covered this scar was taken from right anterior side above knee

Lateral of shin, it's length 31 cm (posteriolateral)

Dorsal of calf (under knee), it's length 13 cm

There was slight swelling around scar (anterior one), there is no bleeding

3.6.6.Anthropometric Measurements:

The examinations were performed in lying position (supine)

Length

Lower Extremities	Left	Right
Functional length	91 cm	90 cm
Anatomical length	90 cm	91 cm

Table No.10 - Final anthropometric measurement for length of lower extremity (cm)

Circumference

Lower Extremities	Left	Right

Around tarsal bones	28.5 cm	27 cm
Around calf	40 cm	44 cm
Around knee joint	47 cm	48 cm
Above knee joint	49 cm	48 cm
Under knee joint	45 cm	40 cm
Quadriceps 15 cm above knee joint	58 cm	58 cm
Vastus medialis 10 cm above knee joint	53 cm	54 cm

Table No.11- Final anthropometric measurement for circumference of lower extremity (cm)

3.6.7.Examination of muscle tone by Lewit:

Muscle	Position	Left side	Right side
Gluteal muscles (maximus medius,minimus)	prone	Less Hpotonic Hypertonic	Normal Normal
Hamstring	prone	Less Hypotonic	Normal
Adductors (magnus, longus, brevis)	supine	Normal	Normal
Triceps surae	prone	hypertone	Normal
Abductors (tensor fascia lata)	supine	Normal	Normal

Quadriceps femoris (rectus femoris, vastus medialis, intermedialis, lateralis)	supine	less hypotonic normal	Normal
Iliopsoas	supine	Normal	Normal
Quadratus lumborum	prone	Normal	Normal

Table No.12- Final examination of muscle tone by Lewit

3.6.8.Joint Play Examination by Lewit

Joints	**Left**	**Right**
Patella	Not restricted	Not restricted
Head of fibula	Examination in semi flexed knee 30. There is no restriction	Not restricted
Talocrural	-	Not restricted
Subtalar	-	Not restricted
Talocalcaneonavicular	-	Not restricted
Chopart's	-	Not restricted
Lisfranc's	-	Not restricted
Metatarsophalangeal	Not restricted	Restricted 3,4 and 5 in caudal direction
Interphalangeal	Not restricted	Not restricted

Table No.13- Final joint play examination by Lewit.

I forgot to examine joint play of sacroiliac joint in initial kinesiological examination, but I examined it and it was blocked on left side and I did mobilization by Lewit in last therapy session with the patient.

3.6.9.ROM Examination By using goniometer

Joint/movement	**Left**	**Right**
Hip flexion Active Passive	100 105	105 120
Hip extension Active Passive	10 15	15 20
Hip abduction Active Passive	25 30	20 30
Hip adduction Active Passive	10 15	10 15
Hip internal rotation Active Passive	- 	20 25
Hip external rotation Active Passive	- 	35 40
Knee flexion in supine Active Passive in prone Active Passive	30 40 15 30	130 130 115 125
Knee extension Active Passive	0 5	0 5

Ankle plantar flexion Active Passive	45 45	45 45
Ankle dorsal flexion Active Passive	0 5	5 10

Table No.14 - Final ROM examination by goniometer

Rotations in hip on left side were not done by goniometer (due to patient condition) while he couldn't do knee flexion until 90 degrees. So we do it evaluational by semiflexed left knee, while patient is supine and when patient is standing shows that patient has restricted left hip ER, IR and knee F. Ankle PF 45 is the basic position of patient's left foot

3.6.10.Muscle Strength Test, by Kendall:

Muscles	**Left**	**Right**
Gluteal muscles (maximus, medius and minimus)	- 4	+4 5
Adductors (magnus, longus, brevis, pectenius, gracilis)	4	5
Abductors (TFL, gluteus medius and minmus)	5 4	5 5
Quadriceps muscles	4	5
Hamstring	-	5
Hip flexors (iliopsoas)	5	5
Tibialis anterior	-	5
Extensor digitorum (longus and brevis)	1	5

Ankle plantar flexors (gastrocnemius, plantaris, flexor digitorum longus flexor halluces longus, soleus)	1 1 1 -	5 5 5 5

Table No.15- Final muscle strength test by Kendall

3.6.11.Muscle Length Test by Janda

Muscles	**Left**	**Right**
Hip flexors (rectus femoris, iliopsoas, pectenius, gracilis, TFL)	-	0
Hamstring	0	1
Quadriceps (rectus femoris)	-	0
Adductors (longus, brevis)	2	1
Quadratus lumborum	0	0
Ankle plantar flexors (soleus, popliteus, gastrocnemius, plantaris)	2 2	1 0
Piriformis	1	1

Table No.16- Final muscle length test by Janda

Examination of piriformis muscle length in modified position with semiflexed left knee
The rest of examined muscles we were not able to do on left leg because limitation of knee flexion

3.6.12.Neurological Examinations

Slight Sensation	**Left**	**Right**

Outer aspect of calf L4	Decreased	Normal
Medial aspect of calf L5	Normal	Normal
Posterior of calf L4,5	Normal	Normal
Dorsum of foot L5	Start sensation	Normal
Lateral aspect of dorsum S1	No sensation	Normal
Sole of foot S2	No sensation	Normal
Medial aspect of foot L4	Better sensation	Normal

Table No.17 - Final neurological examination (dermatomes)

3.6.13Examination of movement patten by Janda

Type of pattern	Left	Right
Hip extension	First contraction of hamstring, then, gluteals last is erector spinea and paravertebral muscles. There is contraction of muscles and the movement is present but patient can't hold for a while against gravity	First contraction of hamstring, then gluteal muscles last in erector spinea and paravertebral muscles. Movement in extension was good
Hip abduction	hip abduction with slight extension, not stabilized pelvis, tend to lateral flexed trunk, but patient	hip abduction with slight external rotation and flexion of hip

Table No.18 - Final evaluation of movement pattern by Janda

3.7.Therapy effect evaluation, prognosis

After all therapy sessions we had with patient we strongly notice the next, increasing in ROM in left hip F 100 hip E 10 hip abduction 25, and in left knee F 30, and in ankle dorsal flexion passively on left side 10 degrees.

Increasing in strength of quadriceps (rectus femoris) on left leg (grade 4 by Kendall).

No more restriction of joint play in patella head of fibula interphalangeal joints metatarsophalangeal joints. Restriction of scars and connective tissues on dorsum of foot and on left claf and shin and under left knee is notably decreased and deep fascia of thigh is mobile. Posture and gait of patient will take time to be changed due to patient condition (position of foot in plantar flexed and inversion) and change of loading on both extremities (around 10-15% on left foot) and decrease sensation. Prognosis, If the patient is continue on the rehabilitation plan and keeping exercises daily at home we expect there will be change in half to one year, by increasing sensation, more powerful muscles on left lower extremity, increasing in dorsal flexion in left foot and elongation of left ankle plantar flexor muscles

4.Conclusion

After therapy sessions patient had with me and my supervisor, it's noticeably that there is increased ROM of Prognosis

If the patient is continue on the rehabilitation plan and keeping exercises daily at home we expect there will be change in half to one year, by increasing sensation, more powerful muscles on left lower extremity, increasing in dorsal flexion in left foot and elongation of left ankle plantar

flexor muscles

hip flexion and extension on left hip, activation and stimulation of weak muscles, increase in sensation of left leg, stretched of shorten muscles, relax hypertonic muscles, correct of posture and gait it will take more time due to patient condition of left leg (foot).

Patient was motivated and working hard exercising well and looking forward to go home

During practice at the hospital, I was having daily morning round with my supervisor on different departments in the hospital, I saw machine for analyzing gait.

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6. Supplements ¶

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6.2.List of tables¶

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¶Table No. 1 5- Final muscle strength test by Kendall (18)¶

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¶Table No. 18 - Final evaluation of movement pattern by Janda

6.3. Abbreviations¶

ABD: abduction

ABDrs: abductors,

ADD: adduction

ADDrs: adductors,

BMI: body mass index.

DFrs: dorsal flexors

E: extension

ER: external rotation

F: flexion,

IPJ: interphalangeal joint

IR: internal rotation

MLT: muscle length test

MPJ: metatarsophalangeal joint

MST: muscle strength test

PFrs: plantar flexors

PIR: post isometric relaxation

ROM: range of motion

TFL: tensor fascia lata

CHARLES UNIVERSITY IN PRAGUE
FACULTY OF PHYSICAL EDUCATION AND SPORT
José Martího 31, 162 52 Praha 6-Veleslavín
tel. +420 2 2017 1111
http://www.ftvs.cuni.cz/

Application for Ethics Board Review

Undergraduate research

Project title: Case study of a patient with the diagnosis after fracture of acetabulum on left side

Nature of the research project: Undergraduate research

Author (chief investigator): Saad Khazim D Al Amri

Supervisor (in case of student research): Mgr. Helena Vomackova

Research project description: Case study of a patient with the diagnosis after fracture of acetabulum on left side. Which take place in Kladno u nemocnice.

Guaranteed safety to be judged by experts: rational for the use of invasive methodologies, procedures minimizing the risk to subject

Ethical aspects of the research: special rational for research involving children, pregnant and nursing women, mentally disabled, prisoners and persons in underdeveloped communities (see the ethics board Code, Faculty of Physical Education and Sport, Charles University, and International Ethical Guideline 5,6,7,8 and 11)

Informed consent (attached)

Date: 10.8. 2015

Author's signature:

Faculty of Physical Education and Sport, Charles University in Prague
ETHICS BOARD REVIEW

Ethics Board members: Prof. Ing. Václav Bunc, CSc.
Prof. PhDr. Pavel Slepička, DrSc.
Doc. MUDr. Jan Heller, CSc.

The Ethics Board at the Faculty of Physical Education and Sport, Charles University, approved the research project.

Approval number: 121/2015

Date: 12. 8. 2015

The Ethics Board at the Faculty of Physical Education and Sport, Charles University, reviewed the submitted research project and **found no contradictions with valid principles**, regulations and international guidelines for biomedical research involving human subjects.

The chief investigator of the project met the necessary requirements for receiving the Ethics Board approval.

UNIVERZITA KARLOVA v Praze
Fakulta tělesné výchovy a sportu
José Martího 31, 162 52 Praha 6

Official school stamp

Signature, REB Chairman

INFORMOVANÝ SOUHLAS

Student: Saad Al Amri, FTVS UK

Pracoviště: Kladno u nemocnice, Vančurova 1548, 272 59 Kladno

V souladu se Zákonem o zdravotních službách (§ 28 odst. 1 zákona č. 372/2011 Sb.) a Úmluvou o lidských právech a biomedicíně č. 96/2001, Vás žádám o souhlas k vyšetření a následné terapii. Dále Vás žádám o souhlas k nahlížení do Vaší dokumentace osobou získávající způsobilost k výkonu zdravotnického povolání v rámci praktické výuky a o souhlas k fotodokumentaci. Při vyšetření a terapii nebudou použity žádné invazivní metody. Dále žádám o souhlas k uveřejnění výsledků vyšetření a terapie a fotografií v rámci bakalářské práce na FTVS UK. Získaná data nebudou zneužita a osobní data v této práci nebudou uvedena.

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Prohlašuji, že jsem shora uvedenému poučení plně porozuměla a výslovně souhlasím s provedením vyšetření a následnou terapií.

Souhlasím s nahlížením výše jmenované osoby do mé dokumentace, fotodokumentaci a s uveřejněním výsledků terapie v rámci studie.

Datum:…….

Podpis osoby, která provedla poučení: …….

Vlastnoruční podpis pacientky: ……